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CONTENTS.

THE WHOLE OF THE LITERARY MATTER IN THE LANCET IS COPYRIGHT.

THE HARVEIAN ORATION on Medicine in the Century before Harvey. By ARNOLD CHAPLIN, M.D., F.R.C.P. 843

AN ADDRESS on Multiple Peripheral Neuritis. By WILFRED HARRIS, M.D., F.R.C.P. 849

ORIGINAL ARTICLES.

The Pathology of Miners' Phthisis. By W. E. GYE, M.D., and E. H. KETTLE, M.D.—(*Illustrated*) 855

The Later Effects of Gas Poisoning. By Lt.-Col. T. E. SANDALL, C.M.G., M.D. 857

Acute Suffocative Œdema of the Lung. By W. J. TYSON, M.D., F.R.C.P., F.R.C.S. 859

Primary Phlegmonous Enteritis. With Notes on a Case Occurring in a Child. By E. E. HUGHES, Ch.M., F.R.C.S. 860

Loss of Weight in Cases of Artificial Pneumothorax. By L. S. T. BURRELL, M.A., M.D., M.R.C.P., and MURRAY Y. GARDEN, M.D. 861

The Handling and Distribution of Milk. By JOHN ROBERTSON, C.M.G., M.D., B.Sc. 892

CLINICAL NOTES.

MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A Note on Paroxysmal Tachycardia Controlled by Parathyroid Gland Tissue. By B. GLANVILL CORNEY, L.S.O., M.R.C.S. 863

A Note on Inoperable Carcinoma Cervicis Treated with Colloidal Copper and Colloidal Manganese. By S. SAXON BARTON, O.B.E., F.R.F.P.S. 864

Certain Renal Storms and Their Interpretation. By W. B. COSENS, M.R.C.S. 864

MEDICAL SOCIETIES.

Royal Society of Medicine: Section of Therapeutics and Pharmacology.—The Problems of Asthma.—Modifications of Gastric Function by Means of Drugs 865

Cardiff Medical Society: Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis ... 867

REVIEWS AND NOTICES OF BOOKS.

Experiences of an Asylum Patient 867

The Principles of Physics and Biology of Radiation Therapy. By Prof. Dr. Bernhard Kroenig and Dr. Walter Friedrich.... 868

Hautkrankheiten und Syphilis im Säuglings und Kindesalter. Ein Atlas. By H. Finkelstein and others 868

Clinical Diagnosis. By Alfred Martinet, M.D., and others. Authorised English translation from the third edition by Louis T. de M. Sajours, B.S., M.D. 868

Tuberculosis in Infancy and Childhood. By J. Claxton Gittings, M.D., and others 869

Les Diarrhées Chroniques. By Louis Timbal 869

The Legacy of Greece. Edited by R. W. Livingstone 869

Journal of Pathology and Bacteriology 869

NEW INVENTIONS.

A Combined Anæsthetic Mask and Airway (Dr. Henry Featherstone).—(*Illustrated*)..... 870

LEADING ARTICLES.

THE CULTURE OF TISSUES IN VITRO 871

ADDISON'S, OR PERNICIOUS, ANÆMIA 871

THE BACTERIOLOGY OF CANNED MEAT AND FISH 873

OVERCROWDING AND TUBERCULOSIS 874

ANNOTATIONS.

Multiple Peripheral Neuritis 874

The Treatment of Tuberculosis of the Larynx.... 875

New Views on the Thymus Gland 875

Deafness in School-Children 876

The Value of the Duodenal Tube in Differential Diagnosis 876

The Relation Between Syphilis and Yaws 876

The Distribution of Kidney Lesions 877

Hospital Executives 877

The Failure of Vaccination with Live Tubercle Bacilli 878

Vaccinia of the Eyelids.... 878

The Mechanism of Emptying the Stomach 878

Pituitary Extracts in Pregnancy and Labour 879

British Red Cross Society and the Spahlinger Treatment 879

SPECIAL ARTICLES.

The Sulphur Springs of the Pyrenees: The Western Pyrenees.—(*Illustrated*) . 880

Vienna: A Sliding Scale of Medical Fees.—Assistance for Retired University Professors.—An Outbreak of Scabies in an Industrial District..... 882

Public Mental Hospital Administration: Report of the Board of Control.. 888

CORRESPONDENCE.

Hospital Trading (Sir P. J. Michelli) 883

The Control of Tinea Cruris (Dr. S. E. Amos) 883

The Differential Diagnosis of Small-pox and Chickenpox (Dr. W. McC. Wanklyn) 884

The Mechanism of the Cochlea (Mr. G. Wilkinson) 884

Provision for the Subnormal ex-Service Man (Dr. P. C. Varrier-Jones) 884

Enham Village as a Centre for Subnormal Men (Sir Fredk. Milner, Bart.) .. 885

Rapid Digitalis Effects by Oral Administration (Dr. Harrington Sainsbury) . 885

Death in the Alps (Dr. W. J. Rutherfurd) 885

Urticarial Conditions and Eosinophilia (Wing-Commander H. M. Stanley Turner) 886

PUBLIC HEALTH SERVICES.

Insurance Practice and Approved Societies 887

THE SERVICES.

Royal Naval Medical Service.—Royal Army Medical Corps.—Royal Air Force.—Indian Medical Service.—The Territorial Decoration 886

OBITUARY.

Edward Collett Hort, F.R.C.P. 887

The late Dr. Herbert Langton 887

MEDICAL NEWS.

University of Cambridge .. 889

University of Sheffield 889

University of Manchester.. 889

University of Wales 889

British Psychological Society 889

Gresham College 889

Society of Superintendents of Tuberculosis Institutions 889

Royal College of Surgeons of England 889

National Council for Combating Venereal Diseases 879

Royal Academy of Medicine in Ireland 888

Hospital Collecting Boxes at Worthing 889

Medical Women's Federation: Council Meeting.—London Association of the Medical Women's Federation 889

Harveian Society of London..... 890

National Milk Conference at the Guildhall 890

Belfast Medical School: Opening of the Session.. 890

Measles Epidemic in Manchester 890

Memorial Service for Dr. M. Mitchell Bird 890

Royal Microscopical Society 890

Health Week in Holborn .. 892

NOTES, SHORT COMMENTS, &c.

Public Health in Palestine: Hospitals and Dispensaries.—Devastating Effects of Malaria.—Water-supply and Other Subjects 894

Medical Diary 891

Appointments 891

Vacancies 891

Births, Marriages, Deaths.. 892

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MR. PRESIDENT, FELLOWS, LADIES, AND GENTLEMEN,—In obeying the command of your predecessor to deliver the Harveian Oration I desire, Sir, to record my deep sense of the great honour bestowed upon me, and of the diffidence I experience in approaching a task that has occupied the abilities of so many distinguished men in the past. Already 202 orators have complied with the conditions formulated in Harvey's bequest. The subject has been presented from many aspects, and I should be guilty of an act of presumption were I to suppose that any part of the field had escaped the minute investigation of so many acute intellects.

Harvey, when founding this oration, indicated with great precision its aims and its extent, but the provisions elaborated with such care by the founder have been interpreted by successive orators in various ways. Sometimes the orator has obeyed the injunctions of Harvey more or less literally, while at other times a brief reference to the commands of the founder has sufficed to link them to the subject of the oration. But Harvey desired this oration to be, above all, the medium of an annual exhortation to this College for the express purpose of keeping alive in the minds of the Fellows certain important principles for the guidance of their conduct in private and professional life—principles as worthy of acceptance to-day as they were in the seventeenth century. For this reason I am constrained to call attention to the commands contained in Harvey's bequest, for they form the essence of the creed of all honourable physicians whether ancient or modern.

These commands of Harvey may be considered for a moment with reference to the manner in which they have been modified to meet the needs of modern times. The founder ordained that this oration should be delivered in Latin, but that tongue has not been heard on this occasion since 1864. The Latin language has ceased to be the usual method of communication between the learned, and by common consent that injunction has been allowed to fall into abeyance. The second injunction imposes upon the orator the duty of mentioning by name all the benefactors of the College, of recounting the work they have accomplished, and of exhorting others to emulate them. But here again the lapse of years has swelled the roll of those who have benefited the College to such an extent that the time at the disposal of the orator would hardly permit him to comply with the command. A judicious selection of names, therefore, is all that the orator can attempt in obedience to this act of piety demanded by the founder. The two remaining injunctions requiring us "to search and study out the secrets of Nature by experiment, and also for the honour of the profession to continue in mutual love and affection," present no difficulty to the orator of the twentieth century, for they comprise the whole duty of the physician in every age in which his life is passed. But when Harvey in 1656 attached to his bequest these two fundamental commands the peculiar condition of political and scientific thought rendered them specially imperative. The experimental method in science was then in its infancy, and many physicians still clung obstinately to the teaching sanctioned through centuries by authority itself based on insecure foundations. Political and religious feeling ran high in the seventeenth century, and the admonition "to continue in mutual love and affection" became the solemn duty of every man who had the welfare of the College near to his heart. Although no direct evidence exists in support of the contention, it is impossible to believe that some echo of the fierce political and religious passions then raging in England was not heard within the walls of the College. For the College contained in its body men ready to die for the king, and men just as ready to send that king to a shameful death; men to whom the surplice was an abomination, and men who sighed for the days of universal orthodoxy, before King Henry VIII. had raised his destroying hand. All honour, then, to this College for the restraint it was able to exercise, so that, while Puritan and Royalist were engaged in a deadly struggle, the Fellows, holding the same divergent opinions, were able to meet and conduct their business with such decorum that history has been unable to record any overt act of enmity. The amount of control needed may be imagined when men like John Bathurst and Laurence Wright, both in Cromwell's service and high in his favour, took their seats at the Comitia side by side with Harvey and Sir Charles Scarburgh, who were no less zealous in the service of their king. May such moderation be an example for all time!

This College, since its foundation in 1518, may be regarded as representative of medical thought in this country, for, with few exceptions, those who have contributed to the advance of the science and art of medicine have been members of its body. But of all those who have conferred honour and distinction upon the College by reason of their additions to our stock of scientific knowledge William Harvey occupies alone the place of honour. His great work, in which he gave for the first time the true explanation of the manner in which the blood circulated, was published to the world in 1628—110 years after the foundation of the College. The appearance of that work marked the beginning of the epoch of modern physiology, and the close of the long period during which the authority of Galen had held undisputed sway. After the publication of the *De Motu Cordis* the scales fell from the eyes, and men broke for ever with the old and inept tradition that had for centuries hindered the advance in scientific thought concerning biology. But however far-reaching the influence of Harvey's great work may have been, it must not be forgotten that it was but one of the epoch-making movements taking place at the same time in other branches of science. For the early years of the seventeenth century witnessed the gathering of the first-fruits from that vast change produced largely by the revival of learning—a change which ended mediævalism and freed the human mind from the fetters of blind adherence to authority.

In my attempt to comply with the conditions laid down in the bequest of Harvey I propose to direct your attention to a consideration of the history of medicine and science during the first hundred years of the existence of this College, or up to the date of the appearance of Harvey's work. In carrying out that project it will be my duty to indicate briefly the chief causes responsible for the decay of learning during the Middle Ages and the revival of letters in the fifteenth century; for the re-birth of the study of medicine and science I hold to be a part of that wonderful change. I shall then pass to a review of the state of medical and scientific knowledge during the sixteenth century, or up to the appearance of Harvey's work in 1628. Finally, I shall offer some considerations concerning the change wrought in medical and scientific thought during the seventeenth century by the advent of Harvey. In adopting this method I shall be able to select from the roll of the College types of mental activity in illustration of the various phases through which medical thought passed during the period under review.

THE AGE OF AUTHORITY.

Until the dawn of the sixteenth century, coeval with the foundation of this College in 1518, it might be asserted that the study of medicine had made little advance in Europe since the Greek period, which closed with the age of Galen. For more than a thousand years, therefore, the world was content with a medical system constructed in ancient times. But it was not medicine and science alone that failed to register any

advance, for the study of all branches of learning was involved in the same black night of stagnation and obscurity, and as age succeeded age Europe receded farther and farther into the abyss of ignorance and intellectual sloth. The chief cause for this lamentable state of learning in Europe was political, and really began on the day when Constantine the Great in 323, spear in hand, followed the invisible heavenly guide in marking out the limits of the city of Constantinople, the future capital of the East. Although the great founder fondly hoped to rule both East and West, while established on the fair promontory at the entrance of the Bosphorus, it soon became evident that the two empires must separate and accomplish their destinies in their own appointed ways. By the time that the great Theodosius was carried to his grave in 395 the division of the empires, begun in 364, was complete, and the Greek influence was confined to territories along the shores of the Bosphorus, the Propontis, and the Eastern Mediterranean, with stately Constantinople as its diadem. As time proceeded, Greek thought, learning, and language became more and more circumscribed within the ever-narrowing limits of the Eastern empire, and the little progress their influence made was entirely in the direction of the East and South. Meanwhile the Western empire in Europe steadily discarded the Greek influence until scarcely any vestige of it remained. To all but a few the Greek tongue in Europe was unknown. Barbarians occupied the throne of the Cæsars, and a crude system of theology prescribed the limits of knowledge, beyond which the minds of men were forbidden to venture. From time to time half-hearted attempts were made to revive Greek thought in the West, but the result was transient, and the dark cloud of ignorance and indifference settled down once more.

Yet it must not be supposed that all learning was dead. The classics were still read in the West, but the knowledge they contained was closely guarded by the religious houses, and was the appanage of their inmates alone. The Church soon became aware that its power, both spiritual and temporal, required support that could be obtained only by an appeal to the intellect. In response to this demand, in the eleventh century was laid the first foundation of that system of learning known by the name of "Scholasticism" which has amazed and, perhaps, appalled the intellectual world ever since. In support of the tenets of the Church, the aid of metaphysics borrowed from Aristotle was invoked, and a system was reared having for its basis certain principles founded upon the authority of antiquity which it was sacrilege to impugn. For centuries intellectual Europe was engaged in the barren task of commenting upon these principles. They could not be submitted to destructive criticism, for to doubt or to inquire entailed pains and penalties in this world and in the world to come.

THE REVIVAL OF LEARNING.

But although Western Europe was unacquainted with the Greek tongue at this time, it was nevertheless possessed of a knowledge of the writings of the Greeks by means of translations into Latin through the medium of Arabian and Syrian translations from the original Greek texts. Through the same tortuous channels the medical writings of the Greeks were brought to mediæval Europe; were appropriated by the "schoolmen," and were subjected to the empty and narrow methods of the commentators. Meanwhile the Eastern empire was slowly dwindling, and its limits were gradually becoming confined to a small area with Constantinople as its centre. But, as Philelphus has said, in that peerless city the Court and the Church still spoke the language of Aristophanes and Euripides, and the libraries were still stored with the priceless manuscripts of the learning of ancient Greece. Although the Greek tongue was lost to Europe, and although the Eastern empire was becoming every year a more and more circumscribed civilisation, two events were about to take place which may be regarded as first steps towards the restoration of the Greek spirit in the West. I refer to the Crusades, and the occupation of Constantinople by the Franks for a period of nearly 60 years. From the fervent pages of Anna Comnena we are made acquainted with the astonishment of the first Crusaders when, with predatory eye, they beheld for the first time the Greek capital in all its luxury and glory. We know also how frightful was the spoliation to which that fair city was subjected by the Franks when, in the name of the Master which both contending parties served, they marched through blood to its capture. It is, however, impossible to suppose that the visits of the Crusaders and the occupation of the city by the Franks did not contribute to the diffusion of the Greek spirit in the West.

The final act which unlocked the treasures of Constantinople and gave to Europe a full knowledge of Greek learning came in 1453, when on that fateful 29th of May Mahomet the conqueror burst through the gate of St. Romanus over the corpse of the valiant Constantine, and the Greek empire ceased to exist after a thousand years of mingled glory and shame. Christendom has rightly deplored the last act of that tragedy when the crescent supplanted the cross at Constantinople. But the historian records with satisfaction that out of the evil thus perpetrated untold good came to Europe. With the final overthrow of the Eastern empire the treasures of Greek learning were released, and became quickly disseminated throughout Europe. The Greek scholars fled and took up their abode in Italy. Ships coming from the Golden Horn carried the priceless manuscripts which the Turk, caring nothing for the learning of the infidel, had spurned. Italy received with kindness the scholar-refugee and his literature. The vanguard of those who were destined to restore the Greek spirit to Europe had already settled in that country, and soon the Italian universities were busily engaged in imbuing themselves with the new influence. Thither flocked students from every part of Europe, and among them one revered by this College, Thomas Linacre, our great founder. Scholasticism was swallowed up in the advancing tide of Humanism; learning revived, and with it medicine and science began to be studied again in a manner calculated to produce solid and lasting results.

Now if acquaintance with the condition of medical knowledge previous to the revival of learning be desired no better book can be consulted than the "History of Physick" written at the beginning of the eighteenth century by that admirable and learned Fellow of this College, Dr. John Freind. This work was composed in 1723, while Freind was lodged in the Tower under political suspicion, and does the greatest credit to his scholarship and vast knowledge of the medical writings of the ancients. Freind is fully worthy of being commemorated this day as a benefactor of the College, as a man of letters, and as a physician.

The condition of medical and scientific knowledge in the Middle Ages, as described by Freind, may be summed up in a few words. With the intellectual stagnation existing at that period in every branch of thought, progress could not be expected. Whatever mental energy was expended had for its aim the foundation of immutable principles that time and the ingenuity of the intellect could never alter. The learned might explain, but they might not criticise. Whatever had received the sanction of authority became a fixed belief, and steps were taken to protect it from doubt and destructive criticism. In fact, the ultimate end of all intellectual effort during the period of the Middle Ages was teleological, and so long as that spirit remained dominant no real advance in any branch of learning could be possible. All the knowledge that the Middle Ages possessed concerning medicine and science came from the Greeks, and even this was presented in an incomplete and inexact form. The Middle Ages, previous to the revival of learning represented, therefore, a stationary period in which, as Whewell has justly observed, learned men could be produced, but not discoverers.

But with the revival of learning in the fifteenth century came a far-reaching change in the attitude of students towards the study of medicine and science. Hitherto they had been content to accept what had been sanctioned by authority. They were not competent to determine whether the texts they read were exact translations from the original, or merely corrupt compilations by ignorant scribes. The recovery of the Greek tongue transferred medicine from men of this class to physicians deeply versed in classical knowledge, who combined the study of humanism with that of medicine and science. Their examinations of the Greek texts enabled them to detect the violence that the translators had committed in their corrupt translations. These humanist or scholar-physicians loomed large in the first half of the sixteenth century, and it has been the desire of some to treat their work with scant respect. But let us remember that they threw off the yoke of the Arabian translations and enabled students to go with safety to the Greek fountain-head of medical knowledge.

Many of the scholar-physicians had acquired their knowledge of Greek in Italy, where the study of that language had reached a high degree of perfection. But of all those who made a pilgrimage to the shrines of the new learning in Italy the great figure of Thomas Linacre, the founder of this College, and the best example of the scholar-physician, possesses for us an absorbing interest. It will not be necessary for me to recount the main facts of his career, and indeed, to do so in this College, his ancestral home, would be an act of impertinence. But I may with propriety comment upon certain features of his life and activities in order to assess the enormous debt this country owes to his learning, and to his efforts to improve the condition of medicine. Already proficient in the Greek language, through the influence of his friend and master, Selling, he travelled to Italy for the purpose of placing himself under the best teachers of the classics. Arrived there, he sat at the feet of Politian, to whom he owed his exquisite taste in Latin composition, and of Chalcondylas, who refined his knowledge of Greek. But while engaged in the pursuits of classical knowledge his thoughts became directed to the study of medicine, and after a residence of a few months at Padua he graduated in medicine at that university. Linacre had spent two years only in Italy, and some have pointed to this short preparation as evidence that the exercises for the degree were merely perfunctory. But in those days a knowledge of medicine as taught by the ancient writers was all that was demanded for the degree of doctor, and Linacre, we may be sure, while studying Greek and Latin, had become fully conversant with the medical texts, so that he could perform with ease the exercises required.

The writings of Galen appear to have attracted him most, for in after years he confined his attention to that author, and devoted his unrivalled scholarship to the purpose of providing correct and elegant Latin translations of his more important works. The success of these translations was great, and largely owing to their popularity the authority of Galen became paramount during the early part of the sixteenth century. Indeed, so sacred was the teaching of Galen during part of the century that John Geynes, a Fellow of this College, was fined and threatened with expulsion for daring to impugn his authority. These translations of Linacre were not commentatorial, but merely good and exact translations from the original Greek, and enabled students of medicine, probably for the first time, to read Galen untrammelled by the useless and prolix commentaries of inexact and mediocre translators. After a perusal of these correct translations came the inevitable scientific sequence of doubt and inquiry.

But to Linacre belongs a glory far in excess of any he obtained as a scholarly translator. Even the solid basis on which his fame rests as the first to revive letters in this country must yield to the position he occupies in our hearts as the great founder of this College—the first institution devoted to the conservation and advance of medicine in this realm. He had visited Italy, then the only place where the influence of the revival of learning was felt. In the various universities where he had pursued his studies, and where he had consorted with men of learning, he was impressed with the manner in which facilities were afforded for the prosecution of the quest for knowledge in all its branches. Padua, then nearing the zenith of its influence, must have had a profound effect upon his mind. No doubt he compared these busy centres of learning with Oxford and Cambridge, still slumbering in the heavy and uninspiring atmosphere of sterile scholasticism. In Italy he felt intellectual life vibrating, and saw men striving to climb the heights unfolded by the revival of learning. In England he remembered only the droning of the commentators, the unprofitable exercises, and the thunders of the nominalists and realists. While preparing for his degree in medicine at Padua he had seen the attention paid to that subject. The care bestowed upon the study of medicine by the universities and the State in Italy sank deep in his mind, and when in after years he resolved to improve the condition of physic in his own country, it was after the Italian model that he shaped his College of Physicians. England had her universities devoted to learning, and now, through the inspiration of Thomas Linacre, she was to have her College of Physicians specially designed to guard the interests of physicians and to promote the study of medicine.

THE SCHOLAR-PHYSICIANS.

To Linacre, the scholar-physician, then, we owe it, and to him alone, that England soon after the revival of learning possessed a College endowed with adequate powers to guide and direct medical progress. The influence of that corporation upon the medical destinies in this country has been great. Throughout the course of centuries the College has retained the characteristics, indelibly impressed by the founder, of high purpose and catholicity of aim. For these reasons we of this College honour this day Thomas Linacre as the founder of our College of Physicians.

But the influence of Linacre bore fruit in other directions. With his friends Grocyn and William Latimer he was responsible for the introduction of the revival of letters in this country. Without that revival the scientific achievements of the seventeenth century could scarcely have been accomplished. Finally, towards the end of his life he designed a scheme for the promotion of the study of medicine in the sister universities, and although the practical application of that scheme fell far short of the intention of the founder, the credit for the idea belongs to Linacre. Indeed, it would appear that in these latter days the desire of Linacre to improve the facilities for the study of medicine in the universities is at last meeting with its reward. At Oxford the funds of the Linacre lectureships are now devoted to the teaching of physiology, while at Cambridge you, Sir, as the occupant of Linacre's chair, have been worthily entrusted with the pious duty of promoting the aims so earnestly desired by the founder.

Less than half a century had elapsed since the death of Linacre before the destinies of the College were placed in the able hands of another scholar-physician, John Caius, a worthy successor of the founder. But for his energy and perseverance it is probable that the influence of the College as a factor in medical progress would have been confined within narrow limits. Caius, like Linacre, was a scholar. He had trodden the same path in his quest for learning in Italy. Taking the founder as his model, he spent his life in promoting the cause of learning and medicine. His benefactions were conspicuous, and whether he was designing the regulations of the College which bears his name, or ruling over this institution as its President, his aim was ever the advancement of knowledge. Although a true type of the scholar-physician, he was the first in this country to write a treatise on clinical medicine, and his short work on the sweating sickness is the

precursor of the work of Sydenham and Heberden. Natural history also claimed his attention, and with Edward Wotton, a Fellow of this College, he shares the honour of being one of the first to write on that subject in this country. Of the thoroughness of his work for the promotion of the interests of this College we have abundant evidence in the first volume of the *Annals* written in his own hand. To the most minute detail he ordered everything, from the compilation of the first book of statutes to the provision of the silver caduceus still in use, and his pious act in rescuing from neglect the tomb of the founder. In common with Linacre, Caius was strongly attracted to the writings of Galen, and spent much of his time when in Italy in making a careful examination of the manuscripts of that author. But his scholarship, although profound, was not cast in such a rigid mould as that of Linacre, and there is evidence that his mind was undergoing the emancipation inevitable with the ever-widening scope of learning taking place in his day. When in Italy he lodged with Vesalius, and from this association it is probable that he acquired his taste for anatomy. In after years, when he refounded Gonville Hall, the study of anatomy received full recognition in the regulations of the College. He also lectured on anatomy before the barber-surgeons, and may thus be regarded as the founder of the study of anatomy in this country. For this, and his unselfish devotion to the interests of the College, we record our thanks this day.

Caius may be regarded as the last conspicuous example of the scholar-physicians, and it will not be out of place to attempt an estimate of the work they accomplished in the cause of medical progress. These men were deeply versed in all the learning of the age in which they lived, and their knowledge of medicine came to them in the ordinary course of their studies. They were scholars first, and sometimes their interest in medicine was inconsiderable. This attitude will, however, occasion no surprise when it is remembered that the knowledge of medicine in those days was stationary, and did not, therefore, oblige the student to keep himself informed concerning its progress. So long as he knew the ancient medical authors, and the commentaries thereon, his knowledge could never be out of date. But when the revival of learning began to influence Europe the stationary period of medical and scientific knowledge soon showed signs of passing away, and it became no longer possible for the scholar to keep up with the advances that were being made. For the revival of learning had let loose upon the world experimental science, and scholarship alone was incompetent to deal with the problems that arose. For these reasons, therefore, soon after the middle of the sixteenth century, science, including medicine, became divorced from scholarship, and a new race of men arose who dared defy written authority, and who inquired only of Nature for the revelation of her secrets. In this way was prepared the road for the great scientific advances which took place in the seventeenth century, one of which was the appearance of Harvey's great work.

The scholar-physicians, then, of whom Linacre and Caius were such shining examples, in spite of their limitations, occupied no inglorious position in the history of medical and scientific advance. They effectually bridged the period between the end of the influence of the Middle Ages and the beginning of sound scientific methods. Their knowledge, it is true, was sought in the study, but their scholarship was invaluable to the medical age in which they flourished. They restored the pure texts of the medical classics, and thus enabled those engaged in the study of medicine and science to begin anew their investigations. The scholar-physicians were also deeply imbued with the higher aims of humanism. From this spirit sprang their desire to benefit mankind, which took definite shape in the foundation in this country of institutions designed to promote the study of medicine and science. In the early years of this College the Roll contained the names of many whose attainments in scholarship far outweighed their ability as physicians. Besides Linacre and Caius may be mentioned John Clement, Edward Wotton, and Richard Bartlot. These men created that spirit of wide culture in the College which remains to the present day. To the scholar-physicians therefore, we render thanks, and especially must we hold in remembrance the work of Linacre and Caius in the foundation of this College and of Caius College at Cambridge.

Attention must now be devoted to the history of the progress made in the sciences, after the ground had been prepared by the revival of learning. Soon after the beginning of the sixteenth century a reconsideration was undertaken of the data on which the sciences were based, and produced a change in the conceptions hitherto regarded as fixed. The first movement in the direction of progress came from the domain of astronomy, when Copernicus, discarding the Greek system, adopted the heliocentric theory. But his epoch-making work did not see light until 1543, although completed many years before, and its full fruition was postponed until Kepler formulated the laws governing the eclipses towards the end of the century. Botany also began to advance. This subject had remained in a stationary condition, and had been satisfied by the compilation of herbals in which the teaching of the ancients was alone regarded. The first to break away from ancient tradition was Leonicenus who impugned the authority of Pliny; and he was followed by Fuchs, Gesner, and Cæsalpinus, all of whom drew their facts from a study of nature rather than from books previously compiled. Towards the end of the sixteenth century the science of physics was recast and placed upon a sound basis. Stevinus had established the principles of the inclined plane; William Gilbert, a distinguished president of this College, had disclosed the properties of the magnet; and Kepler had supplied the deficiencies of Copernicus, thus supplanting for ever the ancient astronomical system of Ptolemy. The laws of moving bodies were soon to be formulated by Galileo, and physics freed from its errors was in a position to lend its aid to the other sciences. With this progress taking place in physical science Aristotle became suspect, for certain of his ideas regarding physics failed to stand the test of modern criticism. His metaphysics had been used for centuries in support of the doctrines of the Church, and his works concerning the biological sciences had long been the text-books of the schools. But when the physics of Aristotle had been called into question, chiefly by Galileo, it was unfairly concluded that other parts of his writings were open to criticism. Without justification, therefore, those works shared the fate of the physics, and for the greater part of the seventeenth century his authority suffered an eclipse which did not pass away until the eighteenth century.

Progress can be seen in whatever science is surveyed in the sixteenth century, for the age had arrived when men began to doubt. When this state of healthy scepticism took possession of the mind, inquiry, which must inevitably lead to the increase of knowledge, was the only logical course that could be pursued.

While these changes were taking place in scientific knowledge, a wider and more profound change was shaping itself in the realm of thought. For, towards the end of the century, Bacon was striving to exorcise from the minds of men the four idols, and was building up that system founded on inductive methods which he was persuaded would guide the intellect to just conclusions. The great philosopher, spurning the useless methods which produced no increase of knowledge, fashioned his system with the single aim of gathering the fruit of intellectual effort for the benefit of mankind. Although we can point to no signal achievement as the result of that system, yet it marks the definite severance from the ancient, and the beginning of modern thought.

THE OBJECTIVE STUDY OF ANATOMY.

But of all the sciences which showed a tendency to advance in the sixteenth century, that of anatomy claims our attention in an especial manner, for through the advance of that science lay the road to Harvey's

great discovery. Anatomy, like the other sciences, had remained dormant until 1543, when a book appeared which exercised the most profound influence upon the subject. I refer, of course, to the "De Humani Corporis Fabrica" of Vesalius, a book from the appearance of which we may date the modern science of anatomy. Vesalius had been brought up to regard the teaching of Galen as beyond the sphere of criticism. But he dissected bodies himself. He used his eyes and found that what he saw was plainly at variance with the account given by Galen and sanctioned by immemorial authority. His mind was torn by conflicting emotions. In his day it required no little courage to impugn so sacred an authority, but eventually he was able to emancipate himself from the old dogmas. He described the human frame as he knew it from his dissections, and when that had been accomplished the days of the authority of Galen were numbered.

THE BEGINNINGS OF PHYSIOLOGY.

After the publication of this sytem of anatomy by Vesalius the anatomists became uneasy in their minds regarding the teaching of the great Galen, but so firmly fixed was his authority that they hardly dared to do more than utter a half-articulate murmur of dissent. For the majority Galen had furnished for all time the true explanation of the manner in which the blood circulated and performed its supreme function of maintaining life, and they shrank from giving up that explanation sanctioned by time and authority. But their eyes told them only too plainly that much of that explanation was mere supposition, and lacking in scientific proof.

What was this theory of the circulation of the blood, and its consequent rôle in the nutrition of the body as advanced by Galen? At the risk of repetition it must be stated in order to appreciate the great induction of Harvey. Galen's explanation, which I summarise from an admirable description recently given by Dr. Charles Singer, was as follows: The food taken into the body became converted into chyle in the intestines, and was carried by the portal vein to the liver, where it was changed into blood, becoming there endowed with the essence of all living things called "natural spirits." The blood thus manufactured and endowed by the liver was then carried by the hepatic vein and the vena cava to the right side of the heart. Here it was purged of its impurities, which found egress by means of the pulmonary artery and lungs to the external air. Then the venous blood thus purified ebbed to and fro in the veins and carried on the functions of nutrition. But a small portion of this venous blood filtered through the septum of the heart by means of invisible pores into the left ventricle, where it came into contact with the external air which had reached that chamber by way of the trachea, the lungs, and the pulmonary veins. By this contact with the air and the innate heat of the heart the blood became endowed with a higher form of spirit, termed the "vital spirit," and became arterial blood, which, ebbing and flowing in the arteries in the same way as the venous or crude blood, carried on its higher functions of nutrition. But the arterial blood which flowed to the brain became endowed there with the highest form of essence known as the "animal spirits," and was distributed to the body by means of the nerves, which were held to be hollow canals.

The main supports, therefore, of the hypothesis of Galen were the liver as the source of the veins and the blood; the communication between the right and left side of the heart through minute and invisible pores in the septum; the presence of three vitalising essences, and the absence of any circular movement of the blood propelled by the heart. This system, partly based on anatomy and partly on hypothesis, was accepted by the world for more than a thousand years. It postponed and fettered any advance in physiology, and on biological sciences generally imposed restrictions similar in effect to the theory of phlogiston on chemistry.

After Vesalius had broken the ground, anatomists who had sat at his feet carried forward his work until by degrees most of the supports of the Galenic hypothesis were weakened. Servetus, Columbus, Cæsalpinus, and Fabricius contributed to the work of destroying the Galenic theory of circulation, but although they gave indications of the coming light, they all lacked the power to draw the all-supreme conclusion. The complete demonstration of the manner in which the blood circulated and nourished the tissues required the work of a genius, and that genius was William Harvey.

In one short work, in size little more than a tract, he proved by a direct appeal to the phenomena of Nature that the teaching of Galen concerning the circulation was wrong. He laid the sure foundation upon which almost the whole of our modern conceptions regarding physiology are based. In the history of scientific thought he takes his place beside Copernicus, Galileo, Newton, Lavoisier, and Darwin. By the intuition of genius he was able to sweep away false ideas and systems grown sacred by lapse of time and in their place to implant sound views acquired on the journey from scepticism to inquiry. Then the book in which Harvey expounded his theory is a model of close and accurate reasoning. Step by step each position is made secure before a new proposition is demonstrated. The whole is then welded together and the inference drawn. Harvey once remarked with a sneer that Lord Bacon wrote philosophy like a Lord Chancellor, and yet the *De Motu Cordis* is perhaps the most perfect example of the inductive method as enunciated by Lord Bacon's vast intellect. Indeed, it is hard to believe that Harvey, who knew Bacon well, was not influenced to some extent by that capacious mind.

Harvey, then, established the primacy of the heart as a muscular organ propelling the blood in the action of circulation, and explained how the blood found its way from the right to the left side of the heart. When these important facts were made secure the whole of the physiological doctrine of Galen fell to the ground, and the science of physiology was left free to pursue its logical course. It would be wrong, however, to assume that these revolutionary views found instant acceptance, for it could not be expected that a system that had endured for centuries would cease to exist without a struggle. For a time efforts were made to seek a compromise between the old and the new physiology. Even Harvey could not altogether emancipate himself from the glamour of the great name of Galen, and throughout his work, which was directed to the subversion of the ancient authority, he always treats him with respect. But eventually Harvey's doctrine became supreme, and by the time that he was carried to his grave in 1657 all but an insignificant minority accepted his views without reservation.

It has sometimes been assumed that the advent of Harvey's book at once displaced the whole of the system of Galen, including his medical teaching. This conception of the effect of Harvey's work is far from the truth, for, as a matter of fact, it had but slight influence upon the practice of medicine during the seventeenth century. The reason for this will not be far to seek when it is remembered that modern physiology began with Harvey, and had to make considerable advances before it could be of real assistance to medicine. A long and distinguished line of physiologists, ending with Haller towards the middle of the eighteenth century, had to accomplish their work before physiology was able to come to the aid of practical medicine. The science of chemistry, also, was uncreated, and it was not until the end of the eighteenth century that it was in a position to lend its powerful aid in the study of medicine. The impetus given to the investigation of the problems of physiological science by the appearance of Harvey's work was truly marvellous. Before his day scarcely any attempt had been made to approach the subject from a rational point of view. But after the advent of the *De Motu Cordis* the progress of physiology was triumphant and steady. When we think of the successful labours of Aselli, the discoverer of the lacteals; of Borelli, who brought to the subject the new physics

established by Galileo; of Malpighi, the father of our knowledge of the glands and the tissues; of Glisson, who first enunciated the doctrine of "irritability"; of the work of Willis and Lower, we can only be amazed at the advance made in a short time largely through the inspiration of the work of William Harvey.

This College justly acclaimed Harvey as its brightest ornament and conferred upon him its most signal honours. His work supplied the incentive to several Fellows who, adopting his methods, contributed in no small degree to the enlargement of the boundaries of scientific knowledge. Among those who followed Harvey's precepts in the period immediately succeeding the appearance of his book, I record the names of Francis Glisson, Thomas Wharton, Thomas Willis, Richard Lower, William Croone, Nehemiah Grew, Edward Tyson, and Clopton Havers, all of whom are worthy of mention on this day for the work they accomplished for science. But the teaching of Harvey left the majority cold, and did not exert any considerable influence upon their methods of investigating disease. Throughout the seventeenth century physicians were content to inquire regarding morbid phenomena in their studies, rather than at the bedside, until they were aroused from their speculations by the work of a man who stands pre-eminent in the annals of the College: I refer to Thomas Sydenham.

SYDENHAM.

Among the successors of Harvey the name of Sydenham finds a distinguished place. But, great as he was, by no exercise of the imagination can he be regarded as being influenced by Harvey's epoch-making work. Nor can he be properly admitted to the circle of men who fashioned the distinctive type of seventeenth century thought. He stood alone in his glory. Knowledge gained from books he despised. The first-fruits of science garnered so marvellously in the beginning of the century were neglected by him, and even the new teaching of anatomy and physiology found him unresponsive. Indeed, except for a great admiration for the work of Bacon, we can hardly point to a single fact warranting us to link him with the spirit of the age in which he lived. He clung tenaciously to the humoral pathology, and was uninfluenced by all the vast changes taking place around him. He was not a scholar; he had a contempt for science, and yet, in spite of these defects, he has left upon medicine in the seventeenth century an impression that will last as long as mankind requires medical aid.

Sydenham was essentially an innovator. He lived in the seventeenth century, but was not of it, and while others were painfully exploring the road of scientific advancement he, with the Father of Medicine as his only guide, fashioned his own path and for all time laid the foundation of clinical medicine. He was eminently fitted for the task of introducing new methods with the stern and vigorous Puritan blood in his veins; a real rebel; a fearless iconoclast. He was the first of a long line of distinguished physicians who raised the art of clinical medicine to its highest pitch. This country has always been renowned for its great clinicians, and the position to which they have attained has been due almost entirely to the influence of the teaching of Sydenham. If it should be asked what effect that teaching had upon the art of medicine, the answer would be given correctly by pointing to the work of Heberden, Bright, Addison, and Watson. His method was scientifically sound, and while others were attempting to make signs and symptoms conform to theory and authority, Sydenham went straight to the bedside to gather facts and make observations. In this he was true to the inductive method: a collector of facts from which to induce general principles.

Puritanism in the seventeenth century produced its Cromwell, the embodiment of relentless energy and resistless brain force; its Milton, who showed to what heights of grandeur and majesty our own dear language can attain; and its Bunyan, who, all unlettered as he was, in the simplest and sweetest vernacular, penned the finest allegory the world will ever read. To these great productions of Puritanism may we not with justice add the name of Thomas Sydenham, the great Puritan physician, who founded for all time and for all countries the art of clinical medicine.

CONCLUSION.

Neither time nor the scope of this oration permits us to pursue further the immediate and remote effects of Harvey's work. Enough, I trust, has been said to show the comparative dearth of scientific endeavour before the date of his work, and the stimulus scientific research received on account of its appearance. In common with all other results of genius, attempts have been made to claim for others the honour of priority in promulgating the central ideas contained in Harvey's book; but they avail nothing. Copernicus was not the originator of the heliocentric theory, and Darwin gave to William Charles Wells the credit of having enunciated first the theory of evolution. But their glory is not diminished by these admissions, for ideas without irresistible proof are often the common property of the human intellect.

I do not propose to detain you with a consideration of the work of Harvey concerning generation, for that subject was dealt with last year in a most able and exhaustive manner by Dr. Herbert Spencer, who brought to his oration the accumulated study and experience of an expert. But there remains Harvey's character as a man, and that is a subject upon which it is good for us to dwell. He lived in an age when men, on account of the state of political and religious feeling, were unusually prone to make enemies, but all that has come down to us regarding his character does infinite credit to the rectitude of his conduct in all the relations of private life. He seemed to be uninfluenced by the strife going on around him, and although attached to the Royalist cause by service and interest he was able to survey the shipwreck of that cause with fortitude and equanimity. His lofty mental stature rendered it impossible for him to stoop to vulgar polemical disputes, and whenever he was obliged to enter the lists in vindication of his scientific views, it was always with dignity and forbearance. The real character of Harvey is admirably portrayed by Sir George Ent in his well-known account of his visit to him in his old age, when he found him forgetting the lacerations of the mind in the pure joy of searching and studying out the secrets of nature by experiment. Kings might lose their heads, and old orders might be subverted for a season, but Harvey's gaze was fixed upon the beacon of eternal truth. His devotion to this College was an outstanding feature of his life. As its most distinguished Fellow he had conferred upon it the highest honour, and in a practical manner he exhibited his deep regard by his benefactions. His solicitude for the welfare of this noble library found expression in the erection of a building, a gift of books, and a bequest of money. A few years after his death the whole of the library, with the exception of 140 volumes, was destroyed in the Great Fire, but that disaster proved to be our richest gain, for it produced the great bequest of the Marquess of Dorchester, to which we owe the rarity and value of our library. No doubt the liberality of the marquess was in part actuated by the injunction of Harvey to emulate those who had benefited the College, and in our day the bequest of Dr. Lloyd Roberts, second only to that of Lord Dorchester, was surely due to the same spirit. This library, raised up and maintained by the spirit of Harvey, is the noblest monument we possess of that wide intellectual culture with which this College has always been prominently identified.

Harvey, then, in his life and work is the shining example to this College, and the injunctions he has laid upon us in his bequest in 1656 may be followed safely by all who desire its welfare. In these modern days, when we stand at the threshold of momentous changes, we may still look for guidance and inspiration from those injunctions, for they aptly express our duty as physicians, as men, and as Fellows of this ancient and honourable College.

An Address
ON
MULTIPLE PERIPHERAL NEURITIS.

Delivered before the Section of Neurology of the Royal Society of Medicine on Oct. 12th, 1922,

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RECOGNITION of multiple or peripheral neuritis as a clinical and pathological entity dates from the publications of Duménil in 1864, and especially from those of Leyden in 1878 and later. Since that time a host of observers have studied the disease, so that the varieties of the commoner forms, the alcoholic, lead, arsenical, and diphtheritic paralyses, are well known. It is not my intention this evening to dwell on those forms whose ætiology is clear and unmistakable, but rather on the numerous lesser known types, the origin of many of which is quite obscure.

ÆTIOLOGICAL CLASSIFICATION.

Multiple neuritis in our present state of knowledge is best classified on an ætiological basis rather than on pathological distinctions or clinical differences, and four main groups may be separated: (1) Those dependent on the absorption of poisons introduced into the body; (2) those due to auto-toxæmia or poisons developed primarily within the body; (3) infective causes, of an organismal nature; (4) cachectic. The first group may usefully be divided into two sub-groups, those due to metallic poisoning, and those due to poisoning by various carbon compounds.

Polyneuritis.

(1) *External Poisons.*—(*a*) Metals: Lead, arsenic, antimony, mercury, silver, copper, phosphorus. (*b*) Carbon compounds: Alcohol, carbon bisulphide, carbon monoxide, dinitrobenzol, chloral, chloretone, anilin.

(2) *Auto-toxæmic.*—Diabetes (pancreatic deficiency), beriberi (vitamin deficiency), puerperal, leukæmic, relapsing, slow chronic, hæmatoporphyrinuric (enterotoxin).

(3) *Infective.*—Diphtheria, typhoid, paratyphoid, scarlet fever, measles, small-pox, pneumonia, influenza, gonorrhœa, septicæmia, rheumatism, parotitis with or without uveitis, malaria, acute febrile polyneuritis, syphilis, tubercle (general multiple neuritis, symmetrical neuritis of feet, acute local brachial neuritis).

(4) *Cachectic.*—Chronic anæmia, malignant, senile, syphilis, tubercle.

The term "toxic polyneuritis" has been much used, but as probably all polyneuritis is dependent on some toxin, its employment seems most appropriate for those cases in which the infective agent or the source of poisoning is not clearly established. Before dealing with these a few examples of rarer forms from the different groups may be referred to.

Rarer Forms of Polyneuritis: Illustrative Cases.

Gowers used to tell a story of a man who consulted his doctor brother for some gastric disorder, and was given a dinner pill containing a small quantity of silver oxide. Being a man of regular habits he continued to take this pill steadily, but noticing some 18 months later that his lips and face appeared slightly bluish, he again consulted his brother, who sounded his heart carefully, and then told him not to worry. Nothing was said about the dinner pill, which he continued to take as before, until wrist-drop developed, for which Gowers was consulted. Argyria is a very rare disease in these days, as silver is now used practically only in lotions.

As a complement to the case just described, I might perhaps refer to a case of mine; the patient was saved from having a gastro-jejunostomy operation performed on him for the relief of supposed duodenal ulcer, by his butler developing on the day previous to that fixed for the operation a pronounced wrist-drop. Investigation then directed to the water-supply showed that the piping bringing the supply to the house some distance from the main in the road had been laid with lead pipes instead of iron.

Carbon Bisulphide.—This is sufficiently uncommon as a cause of polyneuritis to justify a short description of a case I have had recently under treatment.

A boy, aged 15, worked at a boot factory at solutioning on rubber soles. He worked in a shed, which was afterwards described by the inspector as very badly ventilated, using for the purpose of fastening on the rubber soles a rubber solution containing carbon bisulphide. He worked from 8 A.M. to 6 P.M., and first felt unwell in July, 1921, when he began to suffer from headaches almost every night towards the end of his work. The headaches were accompanied by vertigo, but had disappeared by the following morning. He informed me that previous workers at the same job had had to give it up on account of similar headaches and giddiness. He, however, stuck to his work, and in January of this year his right leg began to feel weak and to give way when walking towards the end of the day. This improved, and then the right hand grew weak and lost the power of gripping; this also improved, and the left hand became similarly affected. The headaches ceased in January just before the legs began to be affected. There was never at any time any pain or numbness or any sensory symptoms, objective or subjective. By the beginning of April he began to develop weakness of the dorsiflexors of both feet, being unable to raise the toes off the ground when standing, though the gastrocnemii were strong. Soon also bilateral weakness of the extensors of the fingers and wrists appeared, especially of the right extensor carpi ulnaris. Marked weakness and wasting also of the right first dorsal interosseus and thenar muscles was seen. To electrical testing there was well-marked reaction of degeneration in the extensors in both forearms, in the right first dorsal interosseus, and in the tibialis anticus on each side. The knee-jerks were normal throughout, but the right Achilles jerk was absent, and the left only just obtainable with reinforcement. Treated with strychnine injections and massage he soon showed slight improvement, and after four months had practically recovered.

Carbon Monoxide.—This form of polyneuritis I have never met with, but it is said that a single severe dose of poisoning with this agent may be followed by neuritis, a very unusual feature in polyneuritis, which is usually the sequel of a more sustained or chronic poisoning. Care must, however, be taken in cases of carbon monoxide poisoning not to mistake pressure neuritis of the musculo-spiral, external popliteal, or other nerve trunks for toxæmic neuritis, pressure palsies being especially liable to occur in persons rendered unconscious by coal-gas poisoning or in explosions in coal-pits through lying on a hard surface in one position for many hours. I have, however, seen a most severe attack of multiple neuritis follow immediately after an *intense chill*, in a woman whose bed was soaked through by the rain breaking through the roof. No alcoholism or other cause than the chill could be discovered in this case, which was labelled "rheumatic polyneuritis."

Chloretone has been given extensively in children for chorea, and has been observed to produce a condition of flaccid paralysis with absent deep reflexes, but the recovery on cessation of the drug is generally much more rapid than is usually met with in other forms of polyneuritis. Acute rheumatism or rheumatic fever is rarely, if ever, followed by polyneuritis, yet local perineuritis and fibrositis, as seen in brachial neuritis and sciatica, are common sequelæ of chill and exposure, though other causes frequently contribute, such as dental or intestinal sepsis.

Local *asymmetrical neuritis* of definite nerve trunks, rather than asymmetrical polyneuritis, is also a feature of typhoid and paratyphoid infections. Thus, a man of 29 with paratyphoid, a week after admission to hospital developed severe pains in the upper arms and shoulders, which kept him awake, and were followed by marked paresis of the right serratus, latissimus, triceps, and extensors of the right fingers and thumb, and of the left deltoid.

Another case of asymmetrical severe neuritis of the right median, ulnar, and musculo-spiral nerves occurred in a man aged 27, as the sequel of a febrile attack of uncertain origin with tonsillitis followed by acute nephritis. There was never any peeling of the skin to suggest scarlet fever, and bacteriological

examinations for diphtheria, enteric, and paratyphoid were negative. Possibly the infection was rheumatic, as nephritis is one of the rarer complications of this disease. After two weeks he had severe pains in the right arm from the shoulder to the hand, completely losing the use of the arm, with anæsthesia of the hand up to the wrist. The hand became very clawed and atrophic, with atrophy of the finger pads and skin, though practically complete recovery took place in two years. These asymmetrical forms of toxic neuritis are generally painful, perhaps owing to the inflammatory nature of the lesion affecting the interstitial tissue of the nerves, whereas in the symmetrical polyneuritis without sensory phenomena the lesion is probably purely a parenchymatous degeneration of the nerve elements themselves.

Asymmetrical neuritis of toxic origin may occasionally be met with in chronic alcoholism and diabetes. Musculo-spiral paralysis I have many times seen occur in chronic alcoholism, when the element of pressure could apparently be excluded as a cause. In none of these cases of musculo-spiral palsy was pain a feature of the case, but in the sciatic and external popliteal paralyses met with in diabetes severe pain may be a prominent feature preceding and accompanying the paralysis. It is difficult to understand how a local asymmetrical neuritis can be set up by the action of a circulating toxin, which should presumably act equally and symmetrically on both sides. The fact that definite whole nerve-trunk areas are liable to be affected in the asymmetrical forms is suggestive of the setting up of a local interstitial neuritis rather than of a degenerative parenchymatous neuritis, and this is further supported in my opinion by the fact that these asymmetrical forms are usually intensely painful. It is possible, therefore, if not indeed probable, that the circulating toxin is not the direct factor in the development of the neuritis, but that it has led to the local appearance of an inflammatory interstitial neuritis, such as may result from chill and other so-called rheumatic processes.

The actual nature of the circulating toxin in such apparently simple cases as alcoholic or diabetic multiple neuritis is really most obscure. In all probability it is not the actual alcohol or derivative ethers circulating in the blood that sets up alcoholic neuritis, or this disease would surely be commoner than it is, but rather a secondary auto-toxæmia produced by the chronic long-sustained alcoholism upon the tissues, notably of the digestive tract and the liver. Similarly, in diabetes it can scarcely be the direct action of hyperglycæmia on the nervous structures that sets up local or multiple neuritis, nor certainly is it due to acetone or diacetic acid, as both of these substances may be absent in cases of diabetic neuritis. Probably the neurotoxin in diabetes is of the auto-toxæmic deficiency type, as will be referred to later. Alcoholic neuritis has become much rarer in this country since the restrictions imposed by war conditions, and owing to prohibition it has become a rarity in America.

The *polyneuritic psychosis* described by Korsakow as common in chronic alcoholism with polyneuritis is certainly met with in other forms of polyneuritis, as Korsakow himself showed, and must therefore not be accepted as evidence proving alcoholism to be the cause of an obscure polyneuritis. Some two years ago I had the opportunity of watching throughout to its fatal ending a case of polyneuritis of unknown origin, in which the delusions and characteristic disorientation of time and space familiar in Korsakow's psychosis were very marked.

A man, aged 55, hall porter, early in September, 1920, began to suffer from severe pains in the left hip. After a fortnight he had to give up his work, and three weeks later pains appeared in the right hip. On the 16th he was admitted to St. Mary's Hospital under my care as a supposed case of sciatica. There was some loss of power in both legs, and tactile anæsthesia of the feet and ankles, but no loss of power or of sensation in the arms or hands. Both knee-jerks and Achilles jerks were absent, the plantars flexor. No glycosuria or albuminuria. Wassermann test of blood and cerebro-spinal fluid both negative. On the 26th the electrical reactions were normal, but on Nov. 5th definite reaction of degeneration had appeared in the left dorsi-flexors, and peronei in both legs. By the 12th bilateral foot-drop was well marked, and there was retention of urine, daily catheter being necessary. His mental condition had gradually become unreliable, and by this date delusions were very marked, patient muttering to himself, and replying in the most extravagant manner to questions as to where he had been recently, such as to New York yesterday, and to Jerusalem the day previously, though he would otherwise answer questions quite rationally. He had always consistently denied the imputation of alcoholism, and I was able to convince myself by personal interviews with his wife and with his fellow employees at the Town Hall where he was porter that his statements on this point were true. Irregular pyrexia developed towards the end of October, and he steadily got weaker and more torpid, dying on Dec. 14th. No post-mortem was permitted.

In another case, a man of 45 had a severe attack of polyneuritis, with intense pains in the feet and legs, with loss of the deep reflexes, and considerable delirium. Alcohol as a cause could be excluded. He later recovered all his muscular power, and the knee-jerks returned, but there was permanent considerable loss of memory and mental power, indicating the coexistence of an acute encephalitis with the polyneuritis.

Septicæmia.—This condition is a not uncommon cause of multiple neuritis, differing little in type from alcoholic neuritis. The source of infection may be quite an insignificant wound; in two cases I saw well-marked multiple neuritis follow slight local suppuration due to a grazed skin wound of the hand, and in another case due to a stab wound in the thigh. In one of them an early symptom was loss of accommodation power, which is such a common early symptom in post-diphtheritic neuritis. Septicæmia is a not uncommon cause of multiple neuritis following childbirth or a miscarriage; one of the most severe and painful cases I have ever seen, ending in death from heart failure, occurred in an otherwise healthy girl of 23, after a miscarriage at three months, in all probability an artificially induced abortion. The polyneuritis which has been described as following tetanus is almost certainly of septicæmic origin, rather than due to tetanus toxin, though chloretone used in the treatment has been blamed in one case. The use of antistreptococcic serum I have seen followed by a severe external popliteal paralysis. A gunshot wound necessitated amputation of the foot, but on account of sepsis three doses of antistreptococcic serum were given on three successive days, and then after four days' interval another dose. General joint pains all over resulted, followed four days after the last injection by pains in the right leg, dropped foot, and wasting of the leg, with total paralysis of the extensor longus digitorum and of the peronei. Was this a septicæmic neuritis, or was it the effect of the serum?

Septicæmic neuritis may affect a nerve trunk close to the intervertebral foramina, as in a case of a gunshot wound of the left arm, followed four weeks later by pains in the opposite arm and right side of the neck, with paresis of the right serratus magnus and winged scapula, with hypo-æsthesia of a cutaneous strip from the ball of the thumb along the outer forearm and up to the shoulder, suggestive of neuritis of the sixth cervical nerve.

Generalised polyneuritis affecting all four limbs, with ataxy and loss of the knee-jerks, has been recorded by Clayton in a soldier treated for typhoid by 15 injections of 50 c.cm. each of antityphoid serum. Here again it may be asked whether the polyneuritis was the result of the serum injections, or was due to the typhoid toxin. My own view is that the neuritis is not the result of the serum treatment, but of the previous toxæmia, just as in cases of polyneuritis following diphtheria, whether treated with serum or not, the neuritis should certainly be laid to the credit of the diphtheritic toxin.

A rare form of polyneuritis has been described by Feiling and others accompanying *parotitis and uveitis*, or polyneuritis may follow parotitis alone.

Acute Febrile Polyneuritis.—This condition, first described by Osler, was frequently observed during

the late war, and was described by Gordon Holmes, Bradford, and others. The sequence of the polyneuritis to definite malaise and pyrexia places this type definitely in the infective rather than in the auto-toxæmic group, though the exact source of the toxin has not yet been worked out. Facial diplegia was a common symptom in this type of polyneuritis. I saw a medical officer, just home from France early in 1919, who complained of pains in the left side of the neck with soreness to touch, as though bruised, and almost immediately aching appeared in both forearms; three days later insomnia, and the arms became weak and the hands shaky. After three weeks facial diplegia developed, with a feeling of intense depression and malaise, with furred tongue, though no pyrexia was detected at any time. There was a good deal of pain with hyperæsthesia and tenderness of the backs of the forearms, but no actual muscular paralysis. The knee-jerks were present throughout and the legs were unaffected. There was never any sensory loss, and recovery was complete after three months.

Syphilis.—This disease as a cause of polyneuritis is usually included in the cachectic group, but occasionally it undoubtedly acts as an acute infective toxæmia.

A man, aged 30, acquired syphilis in January, 1910. Three months later he developed some ataxy and numbness of the feet, but recovered. In October the numbness and ataxy returned with rapid onset of weakness of legs and arms, but again almost completely recovered under injections of salicylate of mercury. In January, 1911, 12 months after the original infection, weakness and wasting of the hands and feet began, which steadily progressed to complete paralysis of all muscles below the knees, with bilateral finger-drop and wasting of the forearm muscles. All the deep reflexes were lost, but there was no trace of anæsthesia. By November, 1912, he was recovering fair power in the gastrocnemii, and he could walk fairly with a stick. The hands were now normal, and the knee-jerks had returned, but there was no trace of power in any of the anterior tibial muscles, nor any reaction in them to either form of electrical current. Probably the correct interpretation of this case would be a polyneuritis associated with considerable anterior horn cell damage in the fifth lumbar region.

Tubercle as a cause of polyneuritis has been much discussed, the usual verdict being that such polyneuritis is mainly alcoholic, though the added stress of the tuberculous toxin or cachexia, when combined with the chronic alcoholism, much increases the liability to polyneuritis, just as alcohol plus arsenic, sepsis plus rheumatism, and many other doubly acting causes may combine to produce polyneuritis. Apart from such doubly acting causes, tubercle is a very rare cause of neuritis. I have seen one case of generalised polyneuritis in a man dying from miliary tuberculosis, with no history of alcoholism or other ascertainable cause of neuritis.

Tuberculous Neuritis of the Feet.—In two cases of severe and fatal tuberculous infection I have seen symmetrical pains and wasting of the intrinsic musculature of the feet, with glossy skin. The first case had been diagnosed as gout, in spite of extensive pulmonary tuberculosis, by no less an observer than the late Sir William Broadbent in 1895, and remembering this case when I saw the identical condition of the feet seven years later in a woman with obscure renal disease and pyrexia, I confidently diagnosed tubercle as the cause, though no one else agreed with me until the autopsy confirmed this.

In a few cases I have seen tuberculous pleurisy followed by intensely severe *brachial neuritis* on the same side, with glossy skin and articular disorganisation of the phalanges. Probably this is produced by apical infection of the lung and pleura setting up a secondary inflammatory neuritis in the brachial plexus in its close proximity.

Amongst the *cachectic* causes of polyneuritis severe chronic anæmia is usually quoted as a cause, though it appears to be much rarer than the spinal degenerations of combined sclerosis met with in conjunction with grave anæmia of pernicious type. I published last year in THE LANCET[1] a case of *leukæmic polyneuritis* in a youth aged 17, who developed well-marked symmetrical polyneuritis, with foot-drop and absent deep reflexes and sensory diminution on the feet and legs, with tingling and numbness of the finger pads. His spleen was enlarged three finger-breadths, but there was no leucocytosis, indeed a leucopenia of only 5800, but the cell count was notably inverted, the polymorphs being only 23 per cent. and the lymphocytes 68 per cent. Slight enlargement of the glands in the neck appeared, and one of these was removed for pathological examination, but was reported to be normal. Troublesome hæmorrhage from the wound continued at intervals, again suggestive of leukæmia, and he died six weeks after admission into St. Mary's Hospital, three months after the first appearance of weakness of the legs. Microscopical examination of the liver, kidneys, and peripheral nerves showed these tissues to be infiltrated with lymphocytes, yet it is difficult to conceive that the symmetrical polyneuritis could be due to pressure of the lymphocytic exudation upon the nerve fibres; it must rather have been of toxic origin due to some unknown form of auto-toxæmia connected with the leukæmic process.

Malignant Disease.—This is also included amongst the cachectic group of polyneuritis, though it seems to be rare.

A year ago I saw a civil engineer, aged 69, who had been operated on seven years previously for malignant growth of the ascending colon, a short circuit having been done. He recovered well, and for years lived an ordinary life, travelling a great deal. In October, 1921, he thought he caught a chill, followed by pains in the left shoulder, arm, and forearm, "like a rat gnawing it." The pains spread across the back of the neck and then affected the right forearm, being so severe as to necessitate morphia. When I saw him in December there was complete paralysis of both triceps, and of the extensors of the fingers and ulnar extensors of both wrists, though the radial extensors of the wrists and the supinator longus of each side were normal, but both serratus magnus muscles were very weak. There was a large mass in the right hypochondrium, which was shown at operation to be growth in the ascending colon, with most extensive involvement of the liver. The legs were quite normal, and the knee-jerks brisk; no glycosuria.

The distribution of the polyneuritis in this case was most unusual, the legs being quite unaffected, with bilateral finger-drop and total paralysis of both triceps muscles. The intensity and long duration of the pain were also a striking feature of the case. Possibly chill contributed to the onset of the neuritis, but the long duration of three months with increasing symptoms were more suggestive of a continually acting toxin or cachexia, and is better explained by the extensive carcinoma from which he was suffering.

AUTO-TOXÆMIA.

Perhaps the most interesting group of causes of polyneuritis is that I have labelled "auto-toxæmic." Constantly we are meeting with cases in which the closest investigation can elucidate no cause for the polyneuritis. One is tempted therefore to look upon them as auto-toxæmic, though the Scotch verdict of "not proven" would be more correct.

An unmarried woman, aged 47, a school teacher, early last November began to suffer from burning pains in the legs, the feet becoming numb two months later, with loss of power of walking. There was some swelling of the hands due to rheumatoid polyarthritis, which also involved the left knee-joint. She complained of pins and needles in the fingers, and finger-drop from paresis of the extensor communis, and weakness and wasting of the intrinsic musculature of the hands. Tactile anæsthesia and analgesia of the left hand up to the wrist, but no objective loss of sensation on the right hand, though she says it does not feel natural. Complete left foot-drop and some weakness of the right dorsiflexors. Cannot move the left toes, but can move the right toes. Though the right foot was much stronger than the left, yet there was much denser anæsthesia of the right foot and leg, extending to just above the knee. The knee-jerks were both brisk and equal, though the Achilles jerks were absent, the left forearm flexor jerk being absent, while the right was brisk. After two months the pains in

[1] THE LANCET, 1921, i., 122.

the legs increased considerably, and she complained of a curious subjective sensation "as though she had several pairs of legs in bed." This continued for several weeks. Now, after 11 months, there is some improvement in the muscular power of the legs, but she is still only just able to walk. There was a perforation of the nasal septum, suggestive in appearance of old syphilis, probably congenital, but the blood Wassermann was negative.

It was difficult to assign the cause of this polyneuritis, though I incline to look on it as *rheumatic polyneuritis*, in view of the presence of multiple joint swellings, with pain, and the asymmetry and painfulness of the polyneuritis.

Beri-beri was at one time considered to be an infective polyneuritis due to a bacterial poison, but the more recent view ascribes it to a deficiency of vitamins in the diet, due to the eating of polished rice; the husk of the grain, which is thus lost to the diet, containing all the vitamins. Such a deficiency cause must, of course, act indirectly only, by setting up changes in the metabolic processes of the tissues, and thus probably the production of some insufficiently broken-down excretory product which in the course of circulation poisons the peripheral nerves, causing symmetrical parenchymatous degeneration. The process may be compared to that in *diabetes*, in which the lack of the normal internal secretion of the cells in the islands of Langerhans in the pancreas so alters normal metabolism that an excess of dextrose is produced in the breaking down of the muscular tissue. Yet it is probably neither the dextrose in the blood nor the acetone or diacetic acid by-products which are the actual toxic agent in producing the neuritis. In diabetic neuritis there may be symmetrical numbness and anæsthesia of the extremities, with loss of deep reflexes and with little or no muscular paresis, but well-marked ataxy, so-called diabetic pseudo-tabes. In another form the pains may be extremely severe, and the muscular paralysis well marked, often in the distribution of one sciatic, external popliteal, or anterior crural nerve. Why a circulating toxin should thus set up an asymmetrical neuritis is hard to understand; it is usual to explain this by inferring a locally acting cause in addition, such as overuse or strain of the limb, or undue pressure on the nerve. In the asymmetrical neuritis of rheumatism or of paratyphoid, the asymmetry may be due to local involvement of the nerve sheaths by direct organismal infection, somewhat after the same manner as leprous neuritis, but in diabetes no organisms are known to be at work.

Puerperal Neuritis.—Polyneuritis developing shortly after childbirth, or even during the puerperium, is sometimes considered to be a septicæmic neuritis, due to sepsis acquired during parturition, or to retained septic products in the uterus from a previous pregnancy. I do not myself think that this explanation will cover all the cases of polyneuritis associated with pregnancy, but rather that some are true cases of auto-toxæmia, in which a toxin which produces the polyneuritis is elaborated in the tissues as an abnormal by-product of the pregnancy metabolism.

A year ago I had under my care for some months a married woman aged 30, who, ten weeks after childbirth, complained of weakness of the legs and of numbness and pins and needles spreading in the feet and hands, followed by numbness of the abdomen and chest up to the neck. All the deep reflexes were lost, and she was unable to lift the legs off the bed, while the extensors of the fingers also became weak, but the extensors of the thumb and of the wrist were unaffected. Bilateral facial palsy next appeared, and diplopia, followed by diaphragmatic palsy for several days. There was deep tenderness of the calves and forearms, and well-marked anæsthesia of the feet and ankles, but she never suffered from any spontaneous pains. There was never any pyrexia or recognisable sepsis after the childbirth. She recovered completely after four months.

Ten years ago Batten showed at a clinical meeting of this society a woman with recurrent paralysis and wasting of the hands and legs, with absence of the deep reflexes, the paralysis recurring after two confinements. Such recurrent paralysis will be referred to presently as having been observed in other cases of apparently autotoxic polyneuritis.

Pressure Neuritis.—This form, as a cause of paralysis following childbirth, must be carefully distinguished from toxic polyneuritis, the nerve that usually suffers being the sciatic, and especially its external popliteal portion, from pressure of the fœtal head upon the nerve near its exit from the pelvis at the sciatic notch. Indeed, so vague are some medical men in dealing with "nerve" cases, that I saw one such case of left sciatic palsy following immediately after childbirth, and complicated by musculo-spiral palsy of the right arm from pressure on the edge of the bed during the anæsthetic, forceps having been used, which had been diagnosed as a case of "crossed paralysis," whatever that was supposed to mean.

Cranial Nerve Paralyses.—These are common as a sequel of ordinary pharyngeal diphtheria, the third, fourth, and sixth nerves being commonly affected, and occasionally the seventh, fifth, tenth, and twelfth. The loss of accommodation that is such an early sign in post-diphtheritic palsy, due to paresis of the ciliary muscle, I have also seen in septicæmic neuritis and in one other case of toxic polyneuritis. Walshe has pointed out that the frequency of incidence of cranial nerve paralyses after diphtheria is dependent on the close contiguity of the source of the toxin in the pharynx, as in cases of polyneuritis following accidental diphtheritic infection of an open wound of trunk or limbs cranial nerve paralyses are uncommon.

A definite syndrome has been claimed for *polyneuritis cranialis*, many observations being recorded of neuritis limited to several cranial nerves. Oppenheim thinks these cases are usually due to a basal process involving the cranial nerves. Thus, in February, 1920, Kinnier Wilson showed at the Clinical Section a man who, after three weeks' right-sided otitis media, developed right nerve deafness, right facial palsy, paralysis of the right half of the soft palate and vocal cord, glosso-pharyngeal anæsthesia and hemiatrophy of the right half of the tongue, with bilateral loss of taste.

In a few cases of polyneuritis *optic neuritis* has been met with, as in the puerperal form, and I have seen it in a man who developed slowly foot-drop with anæsthesia of the feet and hands, with pains, and wasting of the anterior tibial muscles, and loss of the deep reflexes, a sequel of syphilis 20 years before, the blood Wassermann being positive. No other sign of tabes was present.

Slow Chronic Polyneuritis.—This term may be applied to cases in which the symptoms gradually increase during many months. Pain is usually either absent throughout, or only trifling at the commencement, but the muscular paralysis becomes extreme, and there may be extensive atrophy.

In one case I saw, a man aged 31, the symptoms gradually increased during 12 months, commencing with pain in the calves and a tired feeling after the appearance of some large purpuric blotches on the legs. The legs gradually became paralysed to the stage of total flaccid palsy, the hands and forearms not becoming involved until nine months after the commencement of symptoms. When I saw him 17 months after the onset there was practically complete palsy of the feet and legs, hands and wrists, with contracture of the feet and hands. All the deep reflexes were lost, and there was considerable anæsthesia of the periphery of all four limbs. The sphincters were normal, and no cause suggestive of polyneuritis could be discovered. Wassermann test negative in both blood and cerebro-spinal fluid.

A girl, aged 15, became gradually weaker during 12 months until all four limbs were totally paralysed; she could not raise the head from the pillow, the eyelids and lips were partially paralysed, there was weakness of the masticatory muscles, and the tongue was somewhat wasted. No sensory symptoms were present at any time except slight paræsthesiæ of the fingers at the commencement. All the deep reflexes were lost, but only slight muscular wasting occurred, and no contractures. No improvement was observable in spite of daily massage and electrical treatment until 18 months after the onset, when she slowly began to regain power, and ultimately recovered perfectly in another two years.

The slow development of the symptoms in such cases strongly suggests a continuously acting toxin, rather than an acute poisoning, and one is driven to

the supposition that an auto-toxæmia is at work. In the girl's case at least the continual absorption of external toxins could be excluded as her first symptoms occurred when at school in South Africa, and continued for three months at home some distance away, and she continued to get weaker for another nine months after being sent to England. In sharp contrast to this slow development may be compared the case of a boy aged 5½, who rapidly developed paralysis of all four limbs within six days, being unable to stand on the third day. Some flexor contracture developed, and some muscular tenderness, but no other sensory loss. All the deep reflexes were lost early. Complete recovery occurred in nine months. No history of sore throat or any other known cause of polyneuritis could be elicited, the only suspicious point being that he had had a bad cold six weeks before. The acuteness of the onset of the polyneuritis is suggestive of an external infection being responsible, though it may be too late when polyneuritis first shows itself six weeks afterwards to detect the original infection. Acuteness of onset of the polyneuritis is not, however, sufficient reason to exclude an auto-toxæmic cause, as will be seen presently when dealing with acute hæmatoporphyrinuria.

Relapsing and Recurrent Polyneuritis.—The commonest cause of recurrent polyneuritis is chronic alcoholism, but recurrence is also met with rarely in cases where the cause is obscure. F. G. Thomson[2] records the case of a youth of 19 whose weakness commenced in the hands and feet five days after being thrown out of a sculling boat, and within another ten days there was complete paralysis of all four limbs and of both sides of the face, with considerable weakness of the trunk muscles. The sensory symptoms were confined to slight numbness of the fingers and the soles of the feet. All the deep reflexes were lost, and considerable wasting developed later in the muscles about the shoulders, forearms, and legs, the extensors being chiefly affected. Recovery was complete in every respect in about two years. An interesting fact in the history was that this boy at the age of 5 years had had apparently a similar attack of motor paralysis affecting all four limbs, ending in complete recovery in 18 months. The acuteness of the onset of the paralysis following the immersion is strongly suggestive of chill being the exciting factor; though his previous similar attack at the age of 5 seems to demonstrate a predisposition in his metabolic processes to the development of a neurotoxin, or possibly an excessive sensitiveness of his peripheral nerves to the action of such neuro-toxin.

H. M. Thomas in 1898 published the case of a man, aged 28, who had five attacks of polyneuritis in succeeding years, and a somewhat similar case was published in 1921 by Nattrass[3] of a boy of 18 with double foot-drop, loss of deep reflexes, and other signs of generalised multiple neuritis, who had had two similar attacks of paralysis, lasting for several months, one at the age of 4 and the other at 17. A peculiarity in his case was enlargement and tenderness of the nerve trunks, such as the median, ulnar, and external popliteal.

Hæmatoporphyrinuric Polyneuritis.—In 1908 my attention was first drawn to this curious syndrome.

A woman, aged 47, was admitted to St. Mary's Hospital with pains in the abdomen following a cold three weeks previously. Her pulse was 120, but there was no pyrexia. The urine was noticed to be dark-reddish coloured, and hæmatoporphyrinuria was demonstrated on analysis. A week later she began to complain of pains all over her limbs and body, like knives, and it was found that she could not raise the arms to the level of the shoulder. The pains were worst in the arms and shoulders, but no anæsthesia was found. In five days she was unable to sit up or to feed herself. Insomnia became troublesome, and there was retention of urine, with overflow. Her pains in the arms were so severe that she complained of feeling as if the skin were being torn off. The knee-jerks were present on admission, but were afterwards lost for some weeks. Three months later she could just hold out her arms, but there was still complete paralysis of the extensors of the fingers on both sides, with reaction of degeneration, though the extensors of the wrist and the supinator longus were good. Ultimately she recovered completely, the hæmatoporphyrinuria having disappeared before she left hospital.

It was not until February, 1921, that I met with another case of this disease.

A man, aged 45, well nourished and living in ideal conditions in the country, when apparently in perfect health, except that he had always been obstinately constipated, was seized with pains in the back, thought to be rheumatism. Next day his urine was dark-red coloured, the pulse was 60, and he now complained of severe pains around the loins and the front of the abdomen, at first thought by his doctor to be renal colic, and then an acute abdomen, for which he was sent into a nursing home and a surgeon fetched from London. The latter, however, refused to operate, making a diagnosis of acute pancreatitis. All the next week his pains were severe, and he was said by his doctor to be jaundiced, with bile in the urine. On the fourth day there was retention of urine, requiring the use of a catheter. After 11 days he became excitable and nervous, for which I was asked to see him. The pulse was then 100, the strength of the limbs and trunk good, and he could stand and walk. The knee-jerks were then normal, as were all the other reflexes. He complained of some paræsthesiæ of the trunk, and, taken with his excitable nervous condition and sleeplessness, I thought he was developing acute mania. There was no history of venereal disease, and I found the cerebro-spinal fluid normal. Two days later I saw him again, he could still stand, but the knee-jerks were now absent, though there was no weakness or anæsthesia. He again had retention of urine, and I witnessed the doctor pass the catheter, and was astonished to see that the so-called bile-stained urine was port-wine coloured, an extreme example of hæmatoporphyrinuria, which was confirmed soon after by spectroscopic analysis. Three days later he complained of "deadness" of the chest and abdomen when touched, and I found large areas in this region now analgesic. Paresis of the deltoids was now well marked, as well as weakness of the flexors of the hips, but no other weakness of the limbs. His rectal temperature was now for the first time slightly raised, and two days later his temperature was 100° F. and the pulse 132. He was now much weaker, unable to turn in bed, and unable to cough owing to weakness of the abdominal muscles. The constipation became extreme, the diaphragm became paralysed, and he died after an illness of three weeks' duration. No autopsy was permitted.

Needless to say, in both these cases sulphonal and other drugs as a possible source of poisoning were excluded. In both cases acute abdominal pains were amongst the earliest symptoms, followed immediately by hæmatoporphyrinuria, rapid onset of pains all over, with paræsthesiæ and paralysis, especially of the arms, loss of knee-jerks, retention of urine, and insomnia. In neither of my two cases was vomiting remarked.

Hæmatoporphyrinuria.—This occurs with symptoms of acute illness quite unconnected with the taking of any drug, such as sulphonal, trional, veronal or its derivatives. Acute hæmatoporphyrinuria is ushered in by severe pains in the abdomen and loins, constipation, and sometimes vomiting. Dark brown to port-wine-coloured urine is an early symptom, and the pains continue and may spread all over the trunk and limbs. The pulse-rate is raised to 100 or 120, but usually there is no pyrexia. Retention of urine and even incontinence may occur, and occasionally mental symptoms may be noticeable, such as general nervousness, excitability, or even delirium, and epileptic fits. Gunther's excellent article in 1911[4] quotes only four cases to be found in the literature, in which severe paralysis rapidly developed, followed by death soon after the onset of the paralysis, the earliest recorded case being that of Ranking and Pardington, in 1890.[5] Grund, in 1919[6] referred to other cases, including his own, in which symmetrical multiple neuritis lasted long enough for bilateral wrist-drop and muscular wasting, with reaction of degeneration, to be observed before death or recovery of the patient. Amongst these cases is that of Schulte,[7] who described the case of a

[2] Brit. Med. Jour., 1910, ii., 1443.
[3] Jour. of Neur. and Psychopath., 1921, p. 159.
[4] Deut. Arch. f. Klin. Med., 1912, vol cv., pp. 89–146.
[5] THE LANCET, 1890, ii., 607.
[6] Zentralb. f. Inn. Med., 1919, xl., p. 810.
[7] Deut. Arch. f. Klin. Med., 1897, lviii., p. 313.

ship's cook at Kiel, aged 35, who was seized with abdominal pains and hæmatoporphyrinuria, followed by typical multiple neuritis affecting the arms only, paresis of the deltoids, biceps, supinator longus, infraspinatus, and extensors in the forearms. The pulse was only 48, no pyrexia, and the man recovered.

Bachlechner in 1914 (Diss. Erlangen) described a case of hæmatoporphyrinuria followed by symmetrical wrist-drop and foot-drop, with reaction of degeneration, in which the paresis developed with two attacks of the acute symptoms, and Gunther in 1920[8] states that repeated attacks of the syndrome of acute hæmatoporphyrinuria may occur within a year, though in none of his cases did polyneuritis develop. Langdon Brown and Williams[9] had previously, in 1909, described a case with three recurrent attacks, in which epileptic fits occurred, but no paralysis. L. F. Barker and Estes in 1912,[10] in an article on Family Hæmatoporphyrinuria, describe the case of a girl of 18 with hæmatoporphyrinuria and polyneuritis, ending fatally after 16 months, passing dark urine for the whole of that time, and suffering from pain in the lower abdomen, recurring nausea and vomiting, vertigo, and epileptic fits. Laparotomy disclosed a dilated pylorus and duodenum. Two months later, after complaining of severe pains all over, bilateral wrist- and foot-drop developed, with extensive atrophy, including the intrinsic hand muscles. The deep reflexes became lost, after being exaggerated, and she died four months later. At the autopsy was found great distension of the stomach and duodenum. Unfortunately these authors give no detailed account of the autopsy, such as of the nervous system, promising a full account in a later paper, which seems never to have been published.

A very interesting point in this last case was that the family history disclosed the fact that four other members of the family seemed to have suffered similarly with hæmatoporphyrinuria and nausea and abdominal pains, one of her sisters having died after being ill for nine months with similar symptoms. The strong family tendency to these symptoms with hæmatoporphyrinuria in these cases is practically conclusive evidence of an auto-toxæmia being the origin of the syndrome. In all probability an intestinal toxin is to blame, and Barker and Estes regard the gastro-duodenal dilatation as primary, the toxæmia producing the hæmatoporphyrinuria and polyneuritis being secondary. In my second and fatal case the obstinate constipation was a striking and troublesome symptom, from which he had always suffered, and it is suggestive that an enterotoxin was here responsible for the acute illness, though what was the actual exciting factor in precipitating the attack is a mystery.

Gunther applied the term acute toxic hæmatoporphyrinuria to those cases in which the symptoms follow chronic poisoning by sulphonal, trional, tetronal, veronal or its derivatives. Other substances such as lead, saffron, and glycerine are also said to produce toxic hæmatoporphyrinuria.

In 1896, while house physician at the National Hospital, I saw hæmatoporphyrinuria followed by increasing weakness, flaccid paralysis, and death in a woman who had been taking 20 grains of sulphonal daily for three months. Recently I have had a case of slight hæmatoporphyrinuria in a man of 65, with increasing pains in the legs, who has been taking from 5 to 7 grains of medinal nightly for five months.

Many cases of this acute sequel of chronic sulphonal poisoning have been published since the early nineties, and in about one-fourth of the cases acute paralysis has been noted. The syndrome closely resembles that of acute hæmatoporphyrinuria not due to drugs, as already described. Thus, severe abdominal pains, vomiting, and constipation are often prominent symptoms, recovery rarely happening when all these three symptoms are present. A typical case was described by Anson[11] which he saw in 1901, of a woman, aged 35, who after taking 30 grains of sulphonal daily for three and a half years developed acute abdominal symptoms, constipation, hæmatoporphyrinuria, intense pains in the legs, loss of knee-jerks, followed ten days later by marked weakness of the legs, increasing to total paralysis, the arms being soon similarly affected. There was no anæsthesia, but incontinence of both sphincters until death.

In Keith Campbell's case in 1898 the paralysis first appeared in the arms, before the legs were affected, and convulsions and nystagmus were noted, death occurring 13 days after vomiting commenced. In most of the toxic, or sulphonal cases with paralysis, this occurred first in the legs, while in the acute neuritis accompanying acute hæmatoporphyrinuria not due to drugs, including my own two cases, the neuritis has appeared usually first in the arms. Such development of the weakness, especially when followed by atrophy, excludes Landry's paralysis, while the symmetry of the paralysis and the absent deep reflexes indicate polyneuritis, not poliomyelitis. It is remarkable how often, including my own two cases, involvement of the sphincters has been met with in hæmatoporphyrinuric polyneuritis.

DIFFERENTIAL DIAGNOSIS.

The differential diagnosis of polyneuritis is sometimes extremely difficult from acute poliomyelitis and from Landry's paralysis. The separation from poliomyelitis in some cases is all the more difficult because of the combination of the two conditions that occasionally occurs. Paræsthesiæ and peripheral anæsthesia will probably indicate the presence of polyneuritis in a doubtful case, while an extensor plantar reflex will be evidence of cord involvement. Asymmetry of the paralysis certainly does not exclude polyneuritis, and wasting of the intrinsic musculature of the hands is also common in polyneuritis, and retention of the knee-jerks is by no means rare. Sphincter paralysis is rare in both poliomyelitis and polyneuritis, but is occasionally met with in both these diseases. The differences in extent of involvement of the sensory nerves on the one hand and the motor nerve fibres on the other in polyneuritis is remarkable, though not constant for the same toxic cause. Lead is almost purely a motor nerve poison, but diabetes may cause extremely painful local neuritis, or generalised sensory symptoms and ataxy, without any pain. No sensory symptoms whatever occurred in my case of carbon bisulphide polyneuritis. Rheumatic forms of neuritis are usually very painful, so are the alcoholic, so, too, tuberculous neuritis of the feet, and the neuritis of malignant disease. Hæmatoporphyrinuric neuritis is also generally painful, though other forms of auto-toxæmic polyneuritis may show little or no sensory involvement, and may thus be mistaken for poliomyelitis or Landry's disease.

Numerous post-mortem accounts have been published of polyneuritis in which there has been found more or less profound degeneration of anterior horn cells, and indeed it is not surprising that in a severe case of polyneuritis, with considerable muscular atrophy lasting for many months, that changes should be found in the anterior horn cells.

Stanley Barnes 20 years ago published in *Brain* such cases under the title of Toxic Degeneration of the Lower Neurones, and sought to distinguish them from polyneuritis by (1) the great atrophy of the intrinsic hand muscles, (2) the comparative slightness of the sensory changes, (3) the absence as a rule of contractures, and (4) the integrity of the psychical condition. All these points seem to be comparatively common in cases which clinically should undoubtedly be classed as polyneuritis. A not irrational view perhaps is that which regards polyneuritis and poliomyelitis as essentially the same process affecting different portions of the same neuron, and there can be no doubt that occasionally mixed cases are met with of permanent cord damage, associated with polyneuritic symptoms which recover.

[8] Ibid., 1920, cxxxiv., pp. 257–297.
[9] THE LANCET, 1909, i., 1105.
[10] Jour. Amer. Med. Assoc., 1912, lix., 718.
[11] Brit. Med. Jour., 1920, i., 634.

THE PATHOLOGY OF MINERS' PHTHISIS.

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IT has long been recognised that certain occupations predispose to pulmonary tuberculosis, and that in these "dangerous" occupations the death-rate from this disease is far higher than in the general population. This is particularly so among those who work habitually in atmospheres which are laden with silica dust. Clinically there is overwhelming evidence that silica induces a fibrosis of the lungs which then become susceptible to tuberculosis, and experimentally there is sound evidence supporting the clinical conclusions.

The two problems arising out of the recorded knowledge which have occupied our attention during the last two years are: 1. Why is silica, conspicuous and possibly alone among common dusts, capable of inducing extensive fibrosis? 2. How does the silicotic fibrosis aid the establishment of tuberculosis?

1. There have been many attempts made to answer the first question. For the most part, however, the answers have not been based upon experimental study. The view most often expressed is that silica owes its injurious quality to its physical properties, but for reasons we have set out in detail elsewhere [1] we are in favour of the more modern view that silica causes fibrosis by acting chemically on the tissues and not in virtue of its physical properties.

2. The second problem is even more difficult and much less work has been done on it. The disorganisation of the lymphatic system in silicosis has been recognised by most authors as a potent factor in the increased susceptibility to tuberculosis. It has also been suggested that silica dust and the tubercle bacillus when concentrated in small foci act together as irritants and set in motion a series of reactions on the part of the lung which neither alone is capable of initiating.

Experimental Work.

Our own work on this question is the outcome of investigations into the factors influencing infection and immunity which have occupied our attention for some time. Among other substances we have used silica as a means of breaking down the normal resistance of tissues to invasion by micro-organisms, and while working with *B. tuberculosis* we obtained results which seem to have a direct bearing upon the pathology of miners' phthisis, and suggested further inquiries along these lines. The principal element in the problem of miners' phthisis is that men who are resistant to tuberculosis become susceptible with the development of silicotic fibrosis. It is important to understand the mechanism of this increased susceptibility not merely as a part of the problem of industrial tuberculosis, but also because general tuberculosis presents a similar, though more subtle, problem.

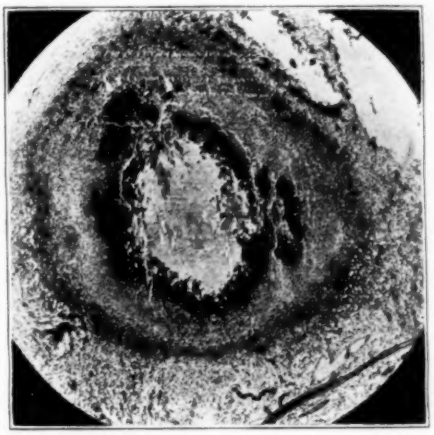
Our work has been based on the facts (1) that colloidal silica is a cell poison; (2) that colloidal silica is the most easily formed soluble form of silica, the circulation of silica in nature depending upon this and (3) that living matter (soil bacteria) is able to break up mineral silicates with formation of soluble silica. We judged it probable that the fibrosis brought about by finely divided silica was due to the *slow* formation in the tissues of silica sol, either directly or through the intermediate formation of sodium silicate which is decomposed by carbonic acid, the sol formed acting as a cell poison. The direct proof of this has been found impossible, and we are, therefore, compelled to fall back upon indirect evidence.

The indirect evidence has been sought in a careful study of the lesions produced when insoluble silica, silica powder which has molecules of water attached, and soluble colloidal silica are injected subcutaneously. The method of "dusting" animals' lungs by inhalation was not chosen because of the difficulty of forcing a sufficient dose into the lungs in a short time and the consequent inability to create an early local lesion. In subcutaneous injections the dust suspension or the solution can be placed in a small area and the changes in the tissues can be studied from hour to hour until healing has taken place.

Lesions Following Injection of Silica.

It may be said at once that there is no essential difference between the reaction produced by soluble silica and that which follows the injection of the insoluble forms. The only obvious difference is that the reaction is more rapid and more transient with colloidal silica, and our findings support very strongly the view that SiO_2 becomes soluble by hydration in the tissues. But, inasmuch as with insoluble silica the reaction is somewhat delayed, the lesions produced by this substance lend themselves rather more readily to analysis than those produced by colloidal silica. The lesion is primarily a destructive one. Within a few hours of the injection of silica the site of inoculation can be recognised as an area of coagulative necrosis at the periphery of which there is an active emigration of leucocytes from the dilated capillaries of the areolar tissue. The condition progresses for some days, resulting in a lesion which is practically specific. (Fig. 1.) It consists of a central acellular area of coagulation necrosis surrounded by a zone of leucocytes, many of which are in varying stages of degeneration. Outside this is a secondary area of necrosis which is limited by granulation tissue. In course of time the necrotic tissue is gradually absorbed and replaced by macrophages, and the final picture is that of an organising inflammatory fibrosis.

FIG. 1.



Lesion produced in the subcutaneous tissue of the mouse six days after the injection of silica. Note the central coagulum bounded by a zone of degenerated leucocytes. Outside this there is a secondary zone of necrosis limited by granulation tissue.

Lesions Following Injection of Silica and Tubercle Bacilli.

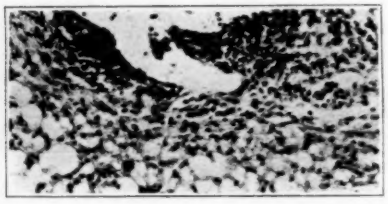
It now remains to investigate what effect this local necrosis has upon a local infection by tubercle bacilli. In order to study this point it is necessary to employ animals which are normally resistant to tubercle, and for the purpose we have chosen mice. The tubercle bacillus possesses only a very slight degree of pathogenicity for the mouse, and this applies equally to human and bovine strains. It can survive

* Working with a grant from the Medical Research Council.
[1] British Journal of Experimental Pathology, 1922, vol. iii., No. 5.

and proliferate in the tissues, but it causes very little reaction. When present in small numbers the local reserves of the tissue appear sufficient to cope with it, though when injected in massive doses it calls forth a pronounced exudation of polynuclear leucocytes. It is readily phagocytosed by the fixed connective tissue cells or polyblasts, as well as by wandering leucocytes, but it can exist for a long period in the bodies of such cells without any apparent change; in fact, it seems likely that it can actually proliferate within phagocytes. It seems to cause no cell necrosis or tissue destruction, and though it may be transported, chiefly by the agency of phagocytes, to lymphatic glands and the viscera, in these secondary foci it gives rise only to a very moderate degree of tissue reaction quite unlike that seen in susceptible animals. (Fig. 2.)

We have observed repeatedly that an injection of tubercle bacilli accompanied by silica into the subcutaneous tissue gives rise to a much greater local reaction than an injection of tubercle bacilli alone, and, further, that general dissemination is earlier and more active. The silica effect, however, is transient, so that we have, in these experiments, inoculated fresh doses of silica weekly into the local lesion, though the dose of tubercle bacilli has not been repeated. In this way we have produced large abscesses containing enormous numbers of tubercle bacilli, far more than were originally injected, but the common silica lesion produced in this way so complicates the microscopic picture that it is impossible to arrive at a clear conception of what takes

FIG. 2.



Lesion produced in the subcutaneous tissue of the mouse seven days after the inoculation of a fine emulsion of tubercle bacilli. There is only a moderate reaction of the fixed and adventitial cells, with little or no emigration of wandering leucocytes.

place. We have therefore resorted to the "early stages" method of analysis. The changes are brought out well in an experiment in which silicic acid was inoculated together with a very fine suspension of tubercle bacilli in normal saline.

Without entering into details it may be said that from day to day an actual local proliferation of tubercle bacilli can be recognised occurring in the central coagulum, which is characteristic of the silica lesion. (Fig. 3.) Whether the coagulum acts merely as a culture medium in which the bacilli are protected from the body cells and fluids, or whether the silica actually stimulates the proliferation of the bacilli, is still uncertain. But there can be no doubt that there is a very active proliferation of the injected bacilli, so that when the final stage of healing is reached almost all the macrophages which enter the lesion at this time contain ingested bacilli. These phagocytes wander into the granulation tissue at the periphery of focus in large numbers and convey infection to a distance.

Conclusion.

The conclusion we draw from these experiments is briefly as follows. The mouse possesses a high degree of natural immunity to tubercle, and even massive doses of bacilli injected beneath the skin can be tolerated fairly well. In course of time the organisms become encapsuled, and though a certain number of them escape this fate, being conveyed to distant parts by the action of phagocytes, the resulting lesion develops very slowly. With smaller doses of bacilli this tolerance is even more obvious. The isolated bacilli are ingested by leucocytes and also by polyblasts, and in the latter elements they live practically in symbiosis, proliferating freely within the cell, which shows no obvious damage from their presence. When silica is introduced along with the bacilli into the subcutaneous tissues of the mouse there is a very different result. The tissues undergo a considerable degree of necrosis, and though an intense leucocytosis is an important part of the accompanying reaction, the centre of the lesion remains acellular for several days and consists of a structureless coagulum. After a preliminary lag

FIG. 3.

Centre of the lesion produced in the subcutaneous tissue of the mouse six days after the inoculation of silica, together with a fine emulsion of tubercle bacilli. The bacilli are actively proliferating in the central coagulum.

of two or three days the bacilli proliferate abundantly in this coagulum, protected from the cellular defences of the body. This protection is, however, only temporary, and in a few more days the coagulum is absorbed and the lesion becomes infiltrated with mononuclear and polynuclear phagocytes which absorb the bacilli with avidity. In the meantime, however, a small dose of bacilli becomes a dose of considerable magnitude, and inasmuch as an important factor in determining an infectious process is the number of organisms introduced, a simple explanation is forthcoming of the effect of silica upon such tuberculous lesions as we have described.

The abnormal prevalence of tuberculosis among men who are exposed to fine silica dust may, we think, be explained by (1) the destructive action of silica on cells whereby foci of necrosis are produced in which tubercle bacilli can multiply, and (2) the disorganisation of the lymphatic drainage of the lung. Our view that the actual cell poison is a soluble derivative of silica has led us to test whether silica sol can influence the course of general tuberculosis in susceptible animals. In Germany soluble silica in various forms has been used in the treatment of tuberculosis. A discussion of the basis of this treatment is outside the scope of the present article; it may suffice to say that claims have been made that the drug has a specific curative effect in this disease. During the past 15 months we carried out a number of experiments designed to test this claim. The general methods pursued have been as follows. Rabbits have been injected intravenously with human tubercle bacilli in doses which were just sufficient to cause lesions visible to the naked eye two months after injection. Some of the animals were treated—by mouth or by intravenous injection—with soluble silica; an equal number were left as controls. In no instance was the process of tubercularisation delayed or prevented by the silica; in a certain number of the animals the process appeared to be helped by the drug. Reviewing all the evidence, however—derived from experiments on more than 30 animals—it would seem that silica sol circulating in the blood-stream does not materially influence a generalised tuberculosis. It is apparently only where the poison is sufficiently concentrated to form local areas of tissue destruction that the growth of the tubercle bacillus is promoted.

THE LATER EFFECTS OF GAS POISONING.*

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HAVING had access to the records of a considerable number of cases of gas poisoning, and the opportunity of examining many of them from time to time during the last three years, it has seemed desirable to put on record points that have appeared clear. The number of cases is not large and the conclusions not different from those in larger collections, but for statistical purposes even a small series may be of value when added to the others. The subject is complicated by the fact that under the heading of gas poisoning are included the effects of a large number of poisonous gases, employed during the war, whose toxic actions are very different, and I think it may be convenient and possibly interesting to consider briefly the various gases used before referring to their combined toxic effects.

Types of Gas Used.

Taking them in the order in which they were first used we have:—

(1) *Chlorine*, first employed by the Germans on April 17th, 1915, and during the summer and autumn of that year.

(2) *Phosgene*, $COCl_2$, first used in the autumn of 1915.

(3) *Sulphuretted hydrogen*, H_2S, *cyanogen*, CN_2, and *arsine*, AsH_3, were also employed in small quantities.

All the above were discharged from gas cylinders for cloud attacks. The last cloud attack on the British front was on August 8th, 1916. Then there were:—

(4) *Tear gas* (brominated ketones and benzyl iodide), and also *ethyl-iodo-acetate*, $C_2H_5COOCH_2$, which were first used in June, 1915.

(5) The combination of *phosgene*, $COCl_2$, and *di-phosgene*, $ClCOOCCl_3$, which was first used during the later stages of the battle of the Somme in September, 1916.

(6) *Mustard gas*, known as "Yellow Cross," di-ethyl-chlor-sulphide, $C_2H_4Cl_2S$, first used at Passchendaele in July, 1917, and very largely during 1918.

(7) *Sneezing gas*, known as "Blue Cross," di-phenyl-chlor-arsine, C_6H_5ClAs, used a little in 1917, but greatly developed in the spring of 1918.

All the above were used in projectors, shells, and trench-mortar bombs.

With the exception of mustard gas and sneezing gas, which were not available until after the armistice, all these gases were also used by us, phosgene being the principal one; in addition, we used stannic chloride, $SnCl_4$, arsenic tri-chloride, $AsCl_3$, prussic acid, HCN, and chloroform, $CHCl_3$, in small quantities, but these latter were not successful, and their use was soon abandoned. It is important to bear in mind the gases used by our own troops, as a large number of our casualties were caused by our own gas owing to leakage, accident, or destruction of cylinders by enemy shell fire. Personally, I have a lively recollection of one period of six weeks in trenches, during which we had gas cylinders installed in the line awaiting a favourable wind for discharge, when my battalion sustained a large number of gas casualties through the bursting of cylinders by enemy shelling.

In investigating any case of gas poisoning the date of the casualty is of considerable importance, as it affords a rough guide to the composition of the gas. The toxic effects, and consequently the after-effects, of the chlorine, phosgene, and mustard-gas groups being very different, it is always desirable to know which group was the cause of the patient's disability.

Definition of Later Effects.

In the first place, it should be understood that by "later effects" is meant the condition of the patient as it exists at the present time (February, 1922) as the result of gassing during the late war—i.e., previous to Nov. 11th, 1918.

The various official reports published by the Chemical Warfare Committee for the Medical Research Committee between April and October, 1918, give us valuable and detailed information from various aspects on the subject of acute and comparatively recent gas poisoning, and therefore I do not propose to enter into any description of the immediate effects. Also, my personal experience of immediate effects was very small, as in France I only had the opportunity of observing cases for the first few hours after the casualty was sustained before they were removed to the field ambulance. Moreover, the immediate effects are not now of urgent importance to us, more than three years after the armistice, except in so far as they throw any light on lasting or permanent effects seen at the present time.

Different Forms of Gas Poisoning.

It will be sufficient if we remember that the immediate result of poisoning by the chlorine group was, roughly, an acute inflammatory condition of the lungs and air passages with acute pulmonary œdema; by the phosgene group a slightly delayed action on the pulmonary tissues and a toxic action on the heart and circulatory system; and by the mustard-gas group an immediate acute irritation of the skin, eyes, upper air passages, and stomach, with bronchial irritation when in strong doses, and a toxic action on the heart only when very concentrated. The effects of the secondary gases of the tear gas and sneezing gas groups were mainly local, and intended to interfere with the wearing of respirators while the men were being poisoned by other gases; they only caused temporary symptoms, and had no lasting effects.

One report, No. 15, of the Chemical Warfare Committee, by Captains G. H. Hunt and C. Price Jones, R.A.M.C., deals with what were at that time known as the "later effects," but the cases on which it is based were really comparatively recent, dating only a few weeks, or at most a few months, from the date of the casualty. With this exception, and that of a paper by Drs. Ramond and Guilhaume in *Presse Médicale*, in 1919, reviewed by Dr. Herbert French in the *Medical Annual*, 1920, the literature on the later effects of gas poisoning appears to be scanty.

Source of Statistics.

The basis of this paper is the investigation of the record cards of all those pensioners in the Oxford area whose disability has been officially recognised and accepted by the Ministry of Pensions as gas poisoning. They are 83 in number, and I propose to consider briefly the symptoms and physical signs as presented on their last examination by a medical board; they are not selected in any way; every case has been included which has been officially accepted and substantiated by documentary evidence—but only these, as mere stated claims to have been gassed are not only very numerous but frequently unreliable. It is, of course, necessary to bear in mind that there may be, and probably are, numerous other cases in the area in which the officially accepted disability—e.g., chronic bronchitis or D.A.H.—is really a sequela or manifestation of gas poisoning, but such cases are not included unless the cause of the disability was definitely determined to be gas poisoning at the time of the man's discharge from the service. Four of the cases date from 1915, three from 1916, 29 from 1917, and 47 from 1918.

Symptoms.

The symptoms complained of are as follows: (1) The principal and commonest complaint is of shortness of breath on exertion, which was present in 70 per cent. of the cases; I give these figures in percentages rather than in actual numbers for the sake of convenience. (2) Cough and expectoration—usually worse in the morning, and frequently worse in winter than in summer, though always persistent—54 per cent. (3) Pain, or a feeling of tightness across the chest, 25 per cent. (4) Palpitation and

* A paper read before the Oxford Clinical Club.

occasional giddiness, 14 per cent. (5) Morning vomiting or nausea with want of appetite, 12 per cent.

Less common symptoms are: (6) Headache, 9 per cent. (7) Nervousness, insomnia, tremulousness, want of energy—i.e., the symptoms of neurasthenia—7 per cent. (8) Lacrymation or soreness of the eyes, 5 per cent.

Physical Signs.

Heart.—When we examine for physical signs to account for these symptoms we find on examination of the heart that 74 per cent. presented no abnormality whatever apart from tachycardia, which will be referred to later; by "abnormality" I imply evidence of enlargement, murmurs, or alteration in the cardiac sounds. In the 19 cases in which the heart did not appear perfectly normal 18 presented signs of slight enlargement, with the apex beat in or close to the nipple line, and 4 of these also had a cardio-respiratory systolic apical murmur; in only one case, however, was there definite enlargement with the apex beat outside the nipple line. Of the remaining 7 cases not perfectly normal, although there was no evidence of enlargement, 3 had an apical systolic murmur, 1 a pulmonary systolic murmur, while in 3 cases the cardiac sounds were noted as weak and distant. It is a disputed point as to what constitutes tachycardia, but by taking a resting pulse-rate of 100 or over as evidence of this condition, we find that 45 per cent. of all cases of gas poisoning suffer from tachycardia, although not usually to a severe degree. Only 5 cases had a resting pulse-rate of over 120, 1 of 140, 1 of 150, and 1 of 160. In only 3 cases was any irregularity of action noted. The exercise response was tested in every case, whether tachycardia was present or not, and the response was good in every case where tachycardia was absent. In cases with initial tachycardia the actual response was fair—except in two cases, where it was poor—but I think we must admit that even with a fair response to a test exercise the actual capacity for work of a tachycardia case is somewhat below normal, and the condition in itself constitutes a disability. Unfortunately no blood examination was made in any case, so that it is impossible to say whether there was any departure from normal conditions in that respect.

Lungs.—On physical examination of the chest the lungs presented no abnormal physical signs in 53 per cent.; of the remainder, 26 per cent. showed signs of emphysema to a slight or moderate degree, while 20 per cent. in addition had some definite signs of bronchitis, but in one case only was the bronchitis severe. In only one case of the series, also, were there any physical signs suggestive of pulmonary tuberculosis, and in this case the evidence was not conclusive: there was a history of hæmoptysis and subsequent sanatorium treatment, but T.B. had never been found in the sputum, and there were certainly no signs of active tuberculosis at the present time. I shall refer to this case later.

Digestive System.—Turning to the digestive system, although a furred tongue was frequently present, no abnormal physical signs of any kind were found in the abdomen; even in those cases complaining of digestive troubles.

Nervous System.—On examination, 7 per cent. were found to present definite physical signs of neurasthenia, with tremors of the hands and tongue, and increased reflexes.

Other Signs.—Definite pharyngitis was found in 7 per cent., and slight conjunctivitis in 5 per cent. Lastly, in a small number of cases there was scarring or pigmentation of the skin, showing evidence of burns by mustard gas, but no case showed any dermatitis or any evidence of a skin disability at the present time.

Having considered the symptoms and physical signs presented by these cases of gas poisoning in their later stages it may be instructive to note the percentage assessment of the disability given by the medical boards—i.e., the extent to which the later effects of gas poisoning are estimated to affect the working capacity of the patient.

Assessment.	Percentage of disability.
In 57 per cent.	Less than 20
„ 21 „ „	20
„ 10 „ „	30

One case was assessed at 40, 3 cases at 50, and 1 case at 70 per cent.

Conclusions.

From the facts presented above we may draw one or two definite conclusions.

1. In the first place, whether physical signs are present or not, every one of these cases still complains of definite symptoms more than three years after the armistice; no man in this area who has been awarded a pension for gas poisoning has as yet admitted that he has really recovered and that he now suffers from no after-effects, and it seems clear that every case still has some diminution of working capacity. The conclusion is that, if complete recovery does not take place at an early stage, the later effects of gas poisoning, if not permanent, are at any rate of very long duration, and lower the standard of health of the individual for an indefinite period.

2. In nearly half the cases (46 per cent.) there is evidence of emphysema or chronic bronchitis or both. The reports of the Chemical Warfare Committee, and, in 1915, Sir J. Rose Bradford and Dr. T. R. Elliott [1] gave detailed descriptions of the pathological conditions found in the lungs in fatal cases. In addition to the damage to the mucous membrane of the air passages a severe disruptive emphysema was present, and we may conclude that in the cases now under consideration the same changes would be found in a less severe degree. These cases, therefore, are unlikely to improve, and will probably tend to get worse in later life. The disability will be permanent; treatment on the usual lines will not differ from that of cases of emphysema and bronchitis in ordinary civil life.

3. There is a popular impression that pulmonary tuberculosis is a frequent sequela of gas poisoning, but I do not think this is borne out by the facts, in this area at any rate. I admit of course that a certain number of T.B. cases, invalided out of the service for this cause, give a history of gas poisoning; the latter is not always substantiated, however. Gas poisoning may, of course, stimulate latent T.B. into activity, but it is a remarkable fact that of all the cases of gas poisoning in this area in receipt of pension not one has developed T.B. or is now under the supervision of the tuberculosis officer. My own feeling is that pulmonary tuberculosis is not a common effect of gas poisoning, and certainly not one of its later effects. J. B. Hawes [2] has stated that, in his opinion, many cases diagnosed as pulmonary tuberculosis after gas poisoning are not proved to be such, and T.B. is not found in the sputum. He points out that the basis of the changes produced by the gases is a proliferative fibrosis which destroys the protective powers of the bronchi, and leads to an invasion by organisms, and while tuberculosis may play a part in the invasion, he considers it a very minor one. It is probable that the case, described earlier in this paper, in which T.B. was suspected was really one of fibrosis such as Hawes has observed.

4. In nearly half the cases (45 per cent.) there is definite tachycardia, and the question of the causation of this condition, upon which prognosis and treatment depend, appears to me to be the most important problem in connexion with the subject. In 85 per cent. of these tachycardia cases no sign of anything abnormal was found on examination of the heart. Is there any definite myocardial change, or is it due to some other cause? Captain R. A. Peters, R.A.M.C., in a report of the Chemical Warfare Committee, states that the changes in the heart in recent cases are secondary to the changes in the lungs, and are due to (*a*) increased resistance in lungs, and (*b*) oxygen want; but it is difficult to understand how this can apply to cases of some years' standing, in many of which there are no symptoms of any lung

[1] British Journal of Surgery, 1915–6, iii., 234.
[2] Boston Medical and Surgical Journal, 1921.

trouble. Tachycardia is undoubtedly more marked in cases of poisoning by the phosgene group. It may be functional only, or it may be due to a persistence of the polycythæmia which is found in recent cases. I do not feel able to express an opinion, and I shall value the opinions of others.

5. The persistence of the gastric symptoms also raises the question of organic or functional causation. The evidence of any actual gastritis or chronic catarrh is not clear, and the nausea and vomiting may be merely functional.

6. Why should neurasthenic symptoms supervene on gas poisoning? Undoubtedly a certain number of cases do develop neurasthenia in a mild degree, but it is not clear whether gas poisoning has a direct causal relationship, or whether the neurasthenia is due simply to the shock to the nervous system at the time of the original casualty.

7. Another interesting point is the pain in the chest of which complaint is so frequently made. Is such pain any evidence of myocardial involvement, or is this also merely a functional manifestation?

8. Lastly, with reference to prognosis, more especially in those cases in which physical signs are absent or very indefinite, does the element of "pension" operate as a factor in the causation or continuance of symptoms?

ACUTE SUFFOCATIVE ŒDEMA OF THE LUNG.*

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THE following case, admitted under my care at the Royal Victoria Hospital, Folkestone, in December of last year, illustrates points to which I wish to call attention.

The patient, a female aged 19, complained early in December of a sore throat, but ate her breakfast and afterwards went out of doors. At 1 P.M. she returned home and said that she could not eat her dinner; soon after this, and quite suddenly, her breathing became very difficult, and she had a choking sensation. At 4 P.M. she was admitted into the hospital. She was now struggling for breath and every few minutes the difficulty increased. There was no cyanosis.

Condition on Examination.—The lungs were resonant on percussion; no adventitious sounds were detected, and both sides moved equally. There was some sucking in of the upper intercostal spaces. Heart normal. Temperature, 102·8° F.; pulse, 124; respirations, 26. Blood-stained frothy sputum was now expectorated for the first time. Urine high-coloured, specific gravity 1030; albumin present, but no other abnormal constituents.

On Dec. 8th there was copious blood-stained frothy expectoration, amounting to one and a half pints. Lungs were still resonant on percussion, but a few moist crepitations were audible at the left base posteriorly. On the 9th herpes appeared round the mouth. On the 10th there was slight dullness at left base of lung, increased vocal fremitus, bronchophony, and tubular breathing. Temperature, 100·4° F.; pulse, 100; respirations, 40. All expectoration had ceased, and the respiratory difficulty had almost gone. There were never any physical signs in the right lung. On the 12th, temperature, 99°; pulse, 88; respirations, 30. Physical signs had practically gone, with the exception of slight crepitations at left base.

The patient made an uninterrupted recovery.

Remarks.

The literature of the subject is meagre and confusing, and until comparatively lately it has not been dealt with. There is more to be found in French and American literature than in our own. Two cases were recorded in THE LANCET (1911, i., 1417) by Dr. A. E. Carver, and another, occurring in a man of 50 with aortic regurgitation, was described by Dr. Leonard Williams in THE LANCET of Dec. 7th, 1907, when he refers to a clinical lecture and other communications on the subject.[1] Several cases were recorded in the *British Medical Journal* during last year. Perhaps the reason why these cases have not been more frequently mentioned is that, on account of their alarming suddenness, they are dealt with by private practitioners and are seldom admitted into hospitals.

Nature of the Œdema.—Acute œdema of the lung may be defined anatomically as a flooding of the pulmonary alveoli with serum, containing albumin and globulin, that has exuded from the interstitial capillaries. This brings pressure to bear on the vessels and creates an obstacle to the pulmonary circulation as well as to its function of hæmatosis. This serum, often blood-stained, is suddenly brought up in large quantity, from one and a half to two pints, with alarming suffocative symptoms. At first very few physical signs are present. The patient either dies or gets well in a few hours. It is strange that many cases occur at night. Females are more frequently attacked than males, and in some cases there is a tendency to recurrence.

Causes.—What causes this acute condition? The most acceptable explanation, and the one generally given, is that of Prof. W. H. Welch of Baltimore, who holds that, owing to the comparative feebleness of the left ventricle of the heart, it discharges with each systole rather less blood than it receives from the right side through the pulmonary veins; the lungs in consequence become overfilled and the blood serum transudes from the capillaries into the air vesicles. As there is *no vaso-constrictor action in the pulmonary vessels* there is nothing to prevent engorgement of the lung capillaries, and an effusion must occur in the alveoli.

The following facts support this view:—1. The commonest lesion in these cases is that of aortic regurgitation, which is known to terminate not infrequently in sudden stoppage of the heart. 2. According to some authorities, particularly the French, the only effective treatment is venesection, which would naturally relieve the overloaded right heart and the stagnant pulmonary circulation.

Other causes are given, but whether these are contributory or primary it is difficult to say. They are as follows: Renal disease, especially the interstitial form, with high arterial tension, and associated with an infection or intoxication. Lesions of the vascular walls; these increase the permeability of the walls. From a pathological point of view a lesion of the capillary walls entails a diminution of their resisting powers, and œdema follows. The lesions are brought about by toxins or poisons—influenza, gastro-intestinal infection, &c.—which injure the capillary walls to the extent of making them permeable, and it is stated by some that the vegetative nervous system also assists. Again, it has been suggested that there may be an alteration in the quality of the blood, which lessens its viscosity or brings about degenerative processes in the vessel walls.

Clinical Types.—In my opinion there are two distinct clinical classes of acute suffocative lung œdema: 1. Cases occurring in people over 40 years of age—in which some organic disease exists, especially aortic valvular regurgitation, generally accompanied by nephritis of the granular type. In this class the attacks are sometimes recurrent and the prognosis is exceedingly bad. 2. The class represented by my case, quoted above, in which no organic disease is discoverable. This form is exceedingly rare. I have been able to find only three or four cases recorded. Influenza has been stated to be the cause in two of them. Dr. J. A. Nixon sends me an account of an epidemic of influenza in France during the war, in which large numbers of cases brought up a great quantity of blood-stained œdema fluid. Some died and some suddenly recovered, but so far these cases have not been recorded or discussed. Somewhat similar cases were noted during the war as a result of phosgene poisoning, where the cause was, of course, apparent. Cases most like my own clinically are those seen after aspiration for pleuritic effusion, in which fluid is drawn off too quickly and in too great quantity, but here again the explanation is simple.

* A paper read before the Association of Physicians of Great Britain at Oxford.

[1] THE LANCET, 1902, i., 73 and 366.

None of the above causes can, I think, satisfactorily account for the case I have quoted. An explanation I wish to offer is this: These are really cases of aborted pneumonias, in which the congestive stage is fully developed, and then the disease stops, being relieved by the escape of the collected serum, to end either in rapid recovery or in rapid death. The consolidation of the lung is not often demonstrated, but the signs of acute congestion are present. It is worth noticing in my case that only one lung was attacked, and that herpes on the lips was present, both symptoms suggesting a pneumonic origin. Influenza seems to favour this condition, being the starting point of the pneumonia in two or three cases recorded—in my case an influenza epidemic was present in the district where the girl lived.

Treatment.—Immediate venesection is the treatment generally recommended (especially by French physicians), together with outward applications, such as wet cupping and mustard plasters. Morphia, iodides, or blisters should not be used for obvious reasons.

PRIMARY PHLEGMONOUS ENTERITIS:

WITH NOTES ON A CASE OCCURRING IN A CHILD.

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Phlegmonous enteritis may be defined as an acute infection of the small intestine characterised mainly by a diffuse inflammatory infiltration of the submucosa. Pathologically it is similar to the more common condition of phlegmonous gastritis and to the less common condition of phlegmonous colitis. Phlegmons of the gastro-intestinal tract are, however, events of rare frequency, and extremely fatal diseases. Phlegmonous enteritis is said to occur sometimes as a secondary manifestation in connexion with such conditions as strangulated hernia and intussusception, where a mechanical interference with the bowel or its circulation has taken place.

As a *primary* condition it is exceedingly rare, and in the interests of knowledge it is desirable that all such cases should be recorded. The analogy of an intestinal phlegmon to a subcutaneous cellulitis is a very close one, but occasionally a circumscribed abscess is formed, and such a case, occurring in the duodenum, has been described by Taylor and Lakin.[1] In an excellent article on the subject, MacCallum,[2] describing a case of his own in 1906, cites seven other cases of primary phlegmonous enteritis which he had collected from the literature. All these cases terminated fatally. Adams and Cassidy[3] also describe a typical case which ended fatally. In a more recent paper Zoepffel,[4] describing a case successfully treated by operation, states that some 30 cases have now been recorded, and is of opinion that the condition occurs more commonly than is suggested by the literature. From the material available it is possible to distinguish the more characteristic features of primary phlegmonous enteritis.

Pathology.

(*a*) *Ætiology.*—The male sex is far more commonly affected than the female, and the ages recorded vary from 20 to 75 years. In some cases, but by no means invariably, a history of previous injury has been obtained. Askanazy (quoted by MacCallum) suggests that the proximal part of the small intestine, owing to its relatively fixed position, is affected by trauma more readily than the more distal and less fixed part, and thus gives rise to a chance for infection. Zoepffel considers that elderly men are prone to the disease by reason of a diminished hydrochloric acid content of the gastric juice (induced by chronic gastritis), which is therefore less bactericidal and allows injurious bacteria to reach the upper intestine. In all cases the exciting cause is a pyogenic organism, usually of the streptococcal class. Hedenius (quoted by MacCallum) considered the phlegmonous infiltration in his case to be of an infectious nature, and similar in that respect to the phlegmons of the subcutaneous tissue.

(*b*) *Morbid Anatomy.*—The site usually selected by the disease is the proximal part of the small intestine, either duodenum or jejunum. In the case described below the lesion occurred in the distal part of the ileum. The mucous membrane of the intestine is greyish or yellow, often swollen and ulcerated, and the valvulæ conniventes are enlarged. The submucosa and muscularis mucosa show considerable swelling owing to a purulent infiltration. In some cases this is associated with a hæmorrhagic extravasation. The muscular coats may show a similar purulent or hæmorrhagic infiltration, or simply an inflammatory œdema.

Signs and Symptoms.—The symptoms usually begin with abdominal pain referred to the epigastrium. Zoepffel describes this pain as being cramp-like, a description which applies in the case which I record below. Vomiting, nausea, or both, may be present. The temperature is not usually high and the pulse-rate is a variable factor. Examination of the abdomen shows slight distension, with tenderness and rigidity, especially of the upper abdomen. A point of some importance is the passage of blood per rectum, either in the stools or on the finger following a rectal examination.

Diagnosis.—The usual diagnosis previous to operation (ante or post mortem) is intestinal obstruction, though in one case a diagnosis of perforated gastric ulcer was made, and in my own case a tentative diagnosis of acute appendicitis was given. Zoepffel states that it may be possible to make a correct diagnosis of primary phlegmonous enteritis; but advantageous as this may appear to be, I am of opinion that it is more important to recognise the presence of an acute abdominal lesion which requires immediate operative treatment.

Treatment.—Operation is the only method of treatment likely to be successful. Excision of the affected gut with restoration of continuity by anastomosis is the ideal method, but, owing to the fact that a high position in the small intestine is usually selected by the lesion, this is not always practicable, and in such cases some surgical ingenuity will be called for.

Prognosis.—This is admittedly bad. The fact that the upper intestine is usually affected militates against a good prognosis, but the early recognition of an acute abdominal lesion and prompt operative treatment will do much to improve a patient's chances of recovery.

Notes of a Case.

The following notes are taken from a case of acute primary phlegmonous enteritis occurring in my own practice.

History.—On May 7th, 1921, a hot spring day, the patient, a boy aged 6 years, in apparently normal health, was "bitten" on the forearms by "midges." An acute local reaction ensued, to such an extent that the family doctor, who was called in, considered that there was a cellulitis of the forearms. Cooling lotions were applied and the condition gradually subsided. Three days later the boy complained of pains in the elbows and knees; examination of these joints led the doctor to make a diagnosis of acute rheumatism, especially as the temperature registered 102° F. Suitable treatment was adopted and was followed by a partial remission of the symptoms. On the 14th, one week after the apparent initial onset, the boy complained of abdominal pain. This pain was paroxysmal and of a cramp-like character, and was associated with a further rise of temperature (103°). There was no vomiting and no nausea; the bowels acted well, and the stools, apart from being somewhat loose, showed no special features. Examination of the abdomen revealed hardness and tenderness of the hypogastrium. This is the information which was given to me when I first saw the boy on the 15th. On examination his condition was unchanged, except that the paroxysms of pain were very frequent. The abdomen now showed slight but definite distension; there was voluntary rigidity of the hypogastrium and tenderness was elicited on deep palpation over this area. Hyperæsthesia was obtained over both iliac fossæ, the patient objecting to the test more on the right than on the left side. It was obvious that an acute abdominal lesion was present, and although a provisional diagnosis of acute appendicitis was given, it was made with a considerable

amount of reserve in view of the unusual history and symptoms. Immediate operation was decided upon.

Operation.—Under ether anæsthesia a right pararectal incision was made, and on opening the peritoneal cavity some free, non-odorous, blood-stained fluid at once escaped. The right iliac fossa was isolated with gauze swabs and the cæcal region exposed without difficulty. The appendix showed nothing more than a superficial congestion—evidently a concomitant feature and not the cause of the abdominal lesion. A rapid appendicectomy was performed. On removing the gauze swabs one had not far to seek for the true lesion. Adherent to the anterior abdominal wall of the hypogastrium by recent adhesions was a coil of small intestine, afterwards located to the distal part of the ileum. The adhesions were easily broken down and the affected coil of gut was delivered through the wound. The length of this coil was roughly estimated at about 18 inches, and the distal limit of the disease was apparently some 8 inches from the ileo-cæcal valve. It was intensely congested, much thickened, almost black in colour, and there were associated with it enormously enlarged mesenteric glands. Excision of the coil was decided upon and carried out, care being taken to include some three or four inches of apparently healthy bowel on both proximal and distal sides. The mesentery was divided close to the bowel and an end-to-end anastomosis established. Drainage of the pelvis was effected by a small rubber tube through a stab wound in the suprapubic region, and the original wound was sutured in layers. The whole operation occupied rather less than one hour, and the boy's condition was, under the circumstances, quite satisfactory.

After Treatment.—Saline infusions per rectum were given for 24 hours and then discontinued. The temperature fell to normal after the first 24 hours, the pulse-rate decreasing pari passu. The drainage-tube, after draining an inconsiderable quantity of blood-stained fluid, was removed on the third day. The bowels acted well on the third day after calomel had been administered in one-grain doses hourly for four hours. The boy made satisfactory progress for two weeks, at the end of which time he had a recurrence of his original symptoms—blotchy rash on the forearms and legs, slight swelling of the knees, streaks of blood in the stools, and paroxysms of colicky pain. Salol, 5 gr., and a mixture containing sod. bicarb., 5 gr., and tinct. belladonna, 5 minims, were administered. The pains ceased during the next 24 hours, and the rash and the joint signs gradually disappeared. The patient subsequently made rapid progress, and returned home one month after the operation, apparently in normal health.

Pathology.—The specimen was forwarded to the Public Health Laboratory, York-place, Manchester, for examination, and I am indebted to Dr. G. D. Dawson for the following report:—

"The specimen consists of 26 inches of the ileum. The whole bowel, but especially the middle third, is dark red in colour. Near the mesentery the peritoneum, elsewhere smooth, has a limited but thick covering of fibrinous deposit; here the bowel wall is puckered. The mucosa is deeply congested, swollen, and covered with thick mucus. Enormous ulcers are present along the whole length of the specimen. Towards the end they are small, but in the middle third one oval ulcer measures $1\frac{7}{16}$ in. in length by $\frac{7}{16}$ in. wide, and another $2\frac{7}{16}$ in. long by $1\frac{3}{16}$ in. wide. In every case the margin is irregular, the base ragged in appearance.

Microscopical Examination.—(*a*) Transverse section through large ulcer. On either side of the ulcer the deeper parts only of the mucosa are present; the rest is more or less disintegrated, and the surface is covered with a layer, sometimes of considerable thickness, of degenerated epithelial, and other cells held together by mucus. The mucous membrane is absent from a large part of the surface, the ulcer extending to the submucosa. The submucosa, especially in the region of the ulcer, is much swollen and œdematous, and contains numerous extensive hæmorrhages (the pigment is partly diffused) and some large areas of small-celled infiltration; a large proportion of these small cells are of the polynuclear type. Beneath the ulcer the structure of the muscular coats is indistinct; there is much œdema and hæmorrhagic infiltration. At either side hæmorrhages are common in the muscular coats.

(*b*) Transverse section through less affected part. The changes are similar in type but less advanced. There is the same superficial necrosis of the mucosa, which, however, is nowhere completely absent. Interstitial hæmorrhages are numerous in the interglandular stroma and in the submucosa. The section passes through a group of much enlarged lymphoid follicles.

(*c*) Sections stained for bacteria. No Gram-positive organisms are present. In the mucosa, but not in the deeper layers, there are numerous clusters of medium-sized Gram-negative bacilli (probably *B. coli communis*).

Cultivation.—Cultures from different parts of the inner surface gave pure growths of *B. coli communis*.

Inoculation.—On inoculation into guinea-pigs cultures of the *B. coli communis* isolated did not appear to be unusually virulent.

Conclusion.—Acute enteritis of phlegmonous type with extensive hæmorrhagic extravasation."

(It is necessary to state that the above examination for bacteria is inconclusive, as I, unfortunately, placed the specimen in a weak solution of formalin before conveyance to the Public Health Laboratory.)

Comments.

The chief features of interest in this case are the differences which separate it from the usual type—notably, the age of the patient, the site of the lesion, and the apparent predisposing cause. The fact that the disease can occur in a child makes it probable that no age is exempt, and it would appear that in children, phlegmonous enteritis—either primary or secondary—occupies a place in the consideration of the differential diagnosis of acute intussusception. The unusual site of the lesion in the lower intestine is difficult of explanation, but there is no question that such a site is a distinct advantage, offering greater facility for operative measures and consequently a much more favourable prognosis.

It is interesting to note the apparent similarity between the initial subcutaneous cellulitis and the subsequent phlegmon of the intestine. Whether the latter had any causal relation with the former is mere conjecture, the difficulty being to discover a reason which will adequately explain the connexion.

References.—1. Taylor, G., and Lakin, C. E.: THE LANCET, 1911, ii., 224. 2. MacCallum, J. B.: Johns Hopkins Hosp. Bulletin, 1906, p. 254. 3. Adams, J. E., and Cassidy, M. A.: Acute Abdominal Diseases, p. 285. 4. Zoepffel, H.: Deutsche Zeitschr. f. Chir., 1920, p. 266.

LOSS OF WEIGHT IN CASES OF ARTIFICIAL PNEUMOTHORAX.

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IN artificial pneumothorax treatment the time-honoured background in a typical picture of progress—namely, the gain in weight—is frequently absent. As a rule when this treatment is started there is a drop in weight for the first few weeks. This loss, however, though disquieting at the time, is generally made up as the treatment continues; but usually when one lung is collapsed the normal weight is never reached, although the weight obtained is greater than it was at the beginning of the treatment. A certain small number of cases, on the contrary, gain weight from the beginning. Others after the initial loss of weight do not begin to gain—except possibly for a short time—but continue to lose steadily, and in one case in particular this loss assumed alarming proportions.

Impaired Metabolism.

We think this loss can be explained on the basis of an impaired metabolism; for it is not difficult to imagine that the collapse of one lung will cause a general metabolic upset to which the body has to accommodate itself. As we hope to prove in a subsequent paper, efficient aeration of the blood becomes more difficult, particularly if the movement of the uncollapsed lung is restricted by a displaced mediastinum. This opinion is supported by the work of Dr. S. W. F. Underhill.[1] The diminished oxygen concentration of the blood apparently causes an inefficient combustion of carbohydrates and fats. A consequent demand on the body fats is made by the

[1] Brit. Med. Jour., 1921, ii., 779.

liver. These respond with great readiness and there is a tendency to fatty infiltration of that organ. We have seen evidence of this in the post-mortem room, in cases where apparently no other explanation was forthcoming for the infiltration by the condition of the other organs. This reasoning explains the tendency to loss of weight and subcutaneous fat in these cases, especially under circumstances which call for an increase of the release of kinetic energy, such as is consequent upon dyspnœa or increased muscular exertion. As treatment continues, however, the uncollapsed lung seems to be able to accommodate itself to the altered conditions and to carry on oxygenation of the blood more fully; metabolism becomes more stable, and the patient begins to put on weight if his muscular activities are restricted. This has an important bearing on the later stages of pneumothorax treatment.

Displacement of the Mediastinum.

While this seems to us the most probable explanation of the initial loss of weight, we have to seek some other or some further cause in those cases where the loss continues. In these cases physical signs, supported by X ray findings, showed that there was a direct relationship between the displacement of the mediastinum and the loss of weight. In two cases conditions approaching pleural hernia were seen, and in one case the shifting of the mediastinum and the loss of weight were due to the stretching of an anchoring adhesion. In these cases, although the patients were placed under the most suitable conditions for gaining weight, the loss continued. When, however, the pressures were lowered and the mediastinum allowed to return towards its normal position, there was at once a gain in weight, and if the mediastinum was again displaced the loss in weight returned. In all these cases the first symptom was loss of weight, and if the displacement of the mediastinum was increased dyspnœa and cyanosis appeared. It seems quite clear to us that this is only a further stage of the initial loss which occurs at the beginning of treatment by artificial pneumothorax; that the uncollapsed lung, hampered by a displaced mediastinum, fails in its function of oxygenating the blood and thereby affects metabolism and causes loss of weight. If in addition there is dyspnœa the increased respiratory effort deprives the body, already over-taxed, of a large amount of energy. This is further supported by the fact that the small number of cases which gain weight from the first have shown either very slight or no displacement of the mediastinum.

From the above it might seem that under no circumstances in the course of artificial pneumothorax treatment must the mediastinum be displaced, but we have to use our discretion and treat each individual case on its merits. Different cases will stand different amounts of displacement of the mediastinum before symptoms appear. Again, where adhesions have to be stretched at the expense of this displacement we may, in cases showing little or no emaciation, decide to bring it about, disregarding the consequent loss of weight, in order to obtain a more efficient collapse of lung, and later when the adhesions have stretched to allow the mediastinum to return. Naturally the circumstances which affect our decision, such as the character of the adhesions, the amount of displacement which can be caused with impunity, and the activity of the disease, vary widely in different cases. As a general rule we do not approve of high intra-pleural pressures, and if the pressure is raised in the hopes of stretching adhesions, it should be done with the utmost caution; if, as so often happens, the adhesions show no signs of stretching, the pressures should be lowered.

Illustrative Cases.

The following cases illustrate the relationship of the displacement of the mediastinum to the loss of weight. They are all cases of pulmonary tuberculosis in which tubercle bacilli have been found.

CASE 1.—Female aged 17. Infiltration and fibrosis of left upper lobe and apex of left lower lobe of lung. Before artificial pneumothorax was induced, even whilst on absolute rest, evening temperature was 99·6°–100·5° F. Patient admitted to hospital July 12th, 1921; pneumothorax was started six days later.

Table of Weights.

	st.	lb.		st.	lb.
July 12th, 1921	8	8	Nov. 28th, 1921	7	12½
Aug. 9th	8	9½	Jan. 2nd, 1922	7	9
,, 24th	8	8½	,, 24th	7	9
Sept. 11th	8	4½	,, 31st	7	10½
,, 20th	8	3	Feb. 14th	7	12
Oct. 20th	8	0	,, 20th	7	12½
Nov. 7th	7	12½	June 6th	8	5½
,, 14th	7	12½			

The initial gain, we think, was due to hospital feeding and rest. Then began the loss as the lung was collapsing. On Oct. 20th X ray showed good collapse of the left lung with slight displacement of the mediastinum to the right. So far the loss of weight was not disturbing, and the patient was up for six hours daily with normal temperature, pulse, and respiration. However, as the loss continued the patient was put back to bed; this stayed loss of weight until after the Christmas festivities, when the weight again dropped. On Jan. 12th, X ray showed considerable displacement of the heart and mediastinum to the right side, with bulging of the upper part of the mediastinum simulating pleural hernia. No refill was given from Dec. 30th until Feb. 10th when the mediastinum had come back towards its normal position. With careful control by X ray refills were given to prevent the re-expansion of lung without causing displacement of the mediastinum, and the patient began to gain weight.

CASE 2.—Female aged 22. Infiltration of upper and middle lobes and apex of lower lobe on right side with evening temperatures of 100° F. Artificial pneumothorax induced Sept. 20th, 1921.

Table of Weights.

	st.	lb.		st.	lb.
Sept. 14th, 1921	7	8	Dec. 30th, 1921	7	9
Oct. 3rd ,,	7	10	Jan. 9th, 1922	7	10½
,, 22nd ,,	7	12	,, 24th	7	8½
,, 31st ,,	7	11	,, 31st	7	8½
Nov. 11th ,,	7	12	Feb. 13th ,,	7	9½
,, 28th ,,	7	12	,, 20th ,,	7	10½
Dec. 17th ,,	7	11	June 6th ,,	8	8½

The loss on Dec. 17th was due to the stretching of pleural adhesions allowing much displacement of the mediastinum. The pressures were lowered and the mediastinum returned slightly—hence the gain on Jan. 9th. The pressures were again raised and the mediastinum further displaced, and the patient once more lost weight. On allowing the mediastinum to return towards its normal position the patient began to gain weight. The treatment is being continued; the patient is afebrile and has no cough or sputum.

CASE 3.—Female aged 21. Infiltration of whole of right lung and slight infiltration of left apex. A right-sided pneumothorax was induced Oct. 27th, 1921.

Table of Weights.

	st.	lb.		st.	lb.
Oct. 22nd, 1921	9	6½	Feb. 14th, 1922	8	5
Nov. 14th ,,	9	7½	,, 27th ,,	8	5
Dec. 12th ,,	9	5½	March 13th ,,	8	5
,, 30th ,,	9	1½	,, 27th ,,	8	7
Jan. 9th, 1922	9	1	April 24th ,,	8	7½
,, 24th ,,	8	12	May 8th ,,	8	8
,, 31st ,,	8	8	,, 22nd ,,	8	8½

The initial gain which usually follows hospital feeding and rest occurred, but gave way to a steady loss. On Jan. 30th the mediastinum was much displaced and the upper part of the mediastinum bulging to the left, simulating pleural hernia. By lengthening the intervals between the refills and regulating the quantity of gas given (at the same time taking care that the lung did not re-expand and produce adherence of the two layers of pleura) the mediastinum was allowed to return to the normal position. The loss in weight was at once stopped and she is still under treatment, but is now free from cough and sputum and in good general condition.

CASE 4.—Female aged 24. Infiltration of right upper and lower lobes. Pneumothorax induced Jan. 19th, 1922.

Table of Weights.

	st.	lb.		st.	lb.
Dec. 9th, 1921	7	9	April 10th, 1922	7	10
,, 20th ,,	7	12½	,, 24th ,,	7	11½
Jan. 9th, 1922	8	1	May 8th ,,	7	12
March 13th ,,	7	9½	June 6th ,,	7	13
,, 27th ,,	7	8½			

The initial gain due to hospital treatment is followed by loss continued up to the end of March. At that time the mediastinum was considerably displaced to the left. It

was allowed to return to the normal position, and the patient at once began to gain weight. The treatment is being continued, and she is free from cough and sputum.

As may be supposed, our theories regarding loss of weight affect our after-treatment of artificial pneumothorax cases to a large extent. Of course, each case has to be considered individually, and great departures may have to be made even from our general principles. During the transition period—that is, until the body has accommodated itself to the collapse of one lung—our aim is to increase anabolism and to decrease katabolism, and to do this the patient should be kept on absolute rest. This period varies greatly in different individuals according to the extent and acuteness of the disease, the number and nature of adhesions, the condition of the uncollapsed lung, and numerous other factors. In cases where collapse is being successfully obtained, where the pulse-rate remains good, the temperature normal after refills, the initial loss of weight slight, and no displacement of the mediastinum occurs, the initial period of rest need not be long. On the contrary, when the lung is held up by adhesions, when the general condition of the patient is poor, and when the temperature remains unstable, it is better to keep the patient on absolute rest, it may be for months, if his psychological condition will stand it. As the body accommodates itself to the altered conditions, as evidenced by a gain in weight and a general feeling of well-being, we gradually extend the patient's activities, at first allowing him an hour on a couch. For the first six months at least the patient should lead a guarded life, and sudden or strenuous physical exertion should be avoided. Indeed, we think that great care should be taken throughout the treatment to prevent the patient from over-exerting himself. We do not mean that no patient should be allowed to work whilst undergoing artificial pneumothorax treatment; on the contrary, we have had many patients doing hard manual labour during the later stages of the treatment. But it must be remembered that the strain on the metabolic processes can be reduced by restricting the patient's muscular activities and output of energy, and we have seen many a patient who was not doing well improve and become a most satisfactory case after being made to take more rest, just as we have seen the same happy result follow the re-adjustment of the intra-pleural pressure by altering the intervals between the refills or the amount of gas given until the optimum pressure for the time was found.

We have to thank Dr. J. J. Perkins for the facilities and help he has given us; also the sister of the ward for her helpful suggestions and the care she has bestowed on the after-treatment.

Clinical Notes:
MEDICAL, SURGICAL, OBSTETRICAL, AND THERAPEUTICAL.

A NOTE ON PAROXYSMAL TACHYCARDIA
CONTROLLED BY PARATHYROID GLAND TISSUE.

BY B. GLANVILL CORNEY, I.S.O., M.R.C.S.

THE endocrine glands may be said to vie with each other in the singularity of their functions; the consequences of their removal, or their impairment through injury or disease, are no less remarkable in the case of the parathyroid bodies than in that of the thyroid or suprarenals. Physiologists allege, for instance, that the function of the parathyroids is of an antitoxic character, and that in bringing about the destruction of guanidini in the blood they exercise a controlling influence over muscular metabolism and maintain muscular tone.[1] If this be true, and guanidine is a poison, it seems natural that the heart should participate in the general steadying effect of these bodies on the muscular system: and the striking relief afforded by their administration in the case of a patient with paroxysmal tachycardia (whom I will call A) recorded by Dr. Clement Dukes[2] becomes explainable on that basis.

The case of another patient (whom I will call B) is now before me, in which violent paroxysms of tachycardia bade fair to terminate the patient's life within a very few weeks, or even at any moment. B is a male, with a history of 30 years' residence in a (non-malarial) tropical country, and, moreover, is the subject of non-syphilitic arterio-sclerosis of long standing, with a blood pressure of 215; A, a female, with no such complications, has a structurally sound heart, and her case has been quoted as one of "a veritable cardiac epilepsy."

History.—B, a retired surgeon, had his first attack of paroxysmal tachycardia seven years ago, followed by others at intervals of from one to two months, the paroxysms lasting from a few minutes to nearly an hour. Two and a half years ago they became longer and more frequent, with pulse-rate of 160 per minute, and marked polyuria during the first hour and a quarter of the attack. Urine had been of low specific gravity for at least 12 years, habitually 1008 to 1010, and free from albumin or glucose. After each paroxysm came a corresponding diminution and condensation of renal excretion for a day or two, even in cold or damp weather. Any unusual muscular effort, especially if sudden, precipitated a paroxysm; but paroxysms also occurred without being traceable to any directly inciting cause. In 1919–20–21 they often lasted from 8 to 14 hours. Apart from this liability B's general health prior to 1921 gave him nothing to complain of beyond some loss of energy, insomnia at times, and a decline in his walking powers commensurate with his age (now 70).

No drug or dietetic treatment seemed to exercise any restraining influence over the attacks. By the end of October, 1921, B was having a very bad time, which continued, with one free interval of nine days at Christmas, until the middle of February, 1922. In the 87 days immediately preceding the 12th of that month he had 34 paroxysms (an average of about three a week) of a few minutes' to 17 and once 20½ hours' duration; the pulse-rate during the attack was always either 152 or 160. The attacks were completely disabling for the time being and very distressing. Dorsal decubitus, with a slight inclination towards the right, was the only tolerable position. The pulse between attacks was irregular and intermittent, usually 84 in frequency, being the short, hard, sudden, sharp beat of arterio-sclerosis. Frequent heart flutters occurred, accompanied by intermission of the pulse, and lasting a few seconds at a time. About this period B noticed an increased liability to cramp in the muscles of the calf and abdomen when stretching in bed; and some fibrillary twitchings in the eyelids and superficial muscles of the thigh and trunk at times.

In January, 1922, the patient was not confined to bed, except during the paroxysms, but he could not rise from a chair, walk from one room to the next, or turn over in bed without an immediate and alarming acceleration of the pulse; any slight muscular effort (raising a window sash, or gently ascending a few stairs) induced a paroxysm of several hours' duration; the act of relieving the bowels provoked a paroxysm on three or more occasions. He was afraid to go out of the house alone, and had to cancel all his engagements.

Parathyroid Treatment.—In these circumstances B decided, with the assent of a medical friend, to give parathyroid gland a trial; and on Feb. 14th he began to take a tablet containing gr. ⅓₀ of the dried substance (Parke, Davis and Co.) three times daily by the mouth when the stomach was empty (as far as practicable), and has continued this measure, sometimes taking only one or two tablets in the day, ever since. On the 15th and 16th the pulse was very irregular and intermittent, and a subdued paroxysm lasting four minutes occurred. From that time forward the result was—as Dr. Clement Dukes said of A's case—dramatic. B described it in his own case as "magical." The paroxysms ceased on the third day after beginning the treatment; in the five months which have since elapsed only three attacks have occurred, for each of which a determining cause was traceable. The general health has greatly improved in all respects; there have been no more cramps or muscular twitchings, and the renal excretion is more normal in volume and specific gravity. B no longer feels the subsidiary heart

[1] Quart. Jour. Exp. Phys., 1917, x., 325. W. H. Howell: Physiology, 1918, p. 877.
[2] Brit. Med. Jour., 1921, ii., 987.

flutters which often ushered in a paroxysm. He is now able to travel in trains or motor vehicles without misgiving, and can walk a couple of miles in the day without undue fatigue. One of the three paroxysms since beginning the parathyroid treatment happened a week after reducing the dose from three tablets in the day to one only. B then resumed the larger dose, which he has since reduced to two tablets daily without experiencing any further attack or trouble.

It is to be hoped that more clinical evidence of the action and value of parathyroid tissue will be forthcoming. The compensating or inhibitive physiological functions of the parathyroid and other endocrine glands are remarkable in the normal living body; that so minute a quantity as one-tenth of a grain, equivalent to three-fifths of a grain of the fresh material, administered not intravenously but by the mouth, should exercise a function akin to that of the living gland is still more remarkable, particularly in that the pharmaceutical preparation of parathyroid gland emanates not from the human body at all, but from the carcass of a graminivorous quadruped.

A NOTE ON
INOPERABLE CARCINOMA CERVICIS
TREATED WITH COLLOIDAL COPPER AND COLLOIDAL MANGANESE.

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FOUR patients were selected as typical cases of inoperable cancer of the cervix with a view to giving colloidal copper a trial. In each case the following clinical findings were considered to make operation futile: (1) Large friable ulcerating growth obliterating cervix and spreading on to anterior or posterior vaginal walls, or both; (2) definite infiltration and thickening of base of broad ligaments by extension of the growth, with fixation of the uterus; (3) in all cases definite loss of weight, and in two slight cachexia.

In each case the diagnosis was confirmed microscopically.

Dosage and Method of Administration.—The drug was injected in each case into the rectus femoris a hand's breadth above the knee, and the muscle gently massaged for a few minutes afterwards. Very little pain or reaction was complained of, especially when the solution was injected very slowly drop by drop, the right and left leg being used alternately. The following dosage was employed:—

Day.	Dose in c.cm.	Day.	Dose in c.cm.
1st	3 Col. Co.	15th	1 Col. Ma.
3rd	1 ,, Ma.	18th	6 ,, Co.
6th	3 ,, Co.	21st	6 ,, ,,
9th	1 ,, Ma.	24th	6 ,, ,,
12th	6 ,, Co.		

Col. Co. = Colloidal copper. Ma. = Manganese.

After this a rest of two weeks was given, and then 3 c.cm. of colloidal copper were given, once each week for another month.

In each case the patient's chief complaints had been: (1) Fœtid and irritating vaginal discharge, (2) frequent and painful micturition, (3) pain, (4) loss of appetite and general ill-health.

Results of Treatment.—In all cases the discharge was considerably lessened and much less fœtid. The growth appeared to be harder to the touch and less friable bimanually. Micturition remained frequent, but was less painful. Pain was relieved in two cases, improved in one, and not improved in the fourth. The general health, appetite, and appearance improved in two cases. In two it remained unaltered. All the patients were dead nine months after commencing treatment.

If any conclusion can be drawn from such a limited number of cases, it would appear to be that while this treatment does not cause any great pain or discomfort in administration, it makes these people distinctly more comfortable for the short period of life left to them. It also gives them the feeling that something is being done for them. There would appear to be no prospect of it arresting the disease for any considerable length of time.

I am indebted to Dr. J. H. Willett, under whose care these patients came, for permission to publish this note.

CERTAIN RENAL STORMS AND THEIR INTERPRETATION.

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Sir James Mackenzie, in his book on "Symptoms and Their Interpretation," encourages placing on record remote signs that may save the unthinking a multitude of mistakes in diagnosis. Clinical observation must be minute and a clinical diagnosis made before asking assistance from the bacteriologist; the young physician, and to a lesser extent the modern surgeon, tend to rely on the bacteriologist's report of the case before stating his opinion. In the following selected cases the remote renal symptoms were paramount, and the report on the urine was definite, showing epithelial débris from the whole of the kidney area, blood in lesser or greater quantities, bacteria of all sorts and kinds, leucocytes innumerable, and *Bacillus coli* nearly always present.

Clinical Symptoms.—These were common to all; pain and temperature varied only in degree: (1) Pain in *both* kidney regions (but no marked tenderness over the twelfth rib) and down one or both ureters—little discomfort over the bladder or testicles, renal skin areas slightly hyperæsthesic. (2) Extreme nausea or actual vomiting. (3) Temperature ranging from 100° to 104° F. (4) Distressing frequency of micturition—sometimes every four or five minutes—often not more than a couple of drachms of what looked like pure blood being passed; each act of micturition accompanied by an exacerbation of pain in one or both loins; the loin pain is rarely continuously acute on one side; it usually alternates. (5) Marked flatulency, no abdominal distension.

The previous history was absolutely negative; in some cases there was only a history of "indigestion" which resolved itself into flatulency. Case 4 had a definite history of gall-stones when a young man; the others all declared they had previously been in good health.

X ray of kidney regions negative in all cases. Urinalysis I have recorded above. Pain so acute that a hypodermic injection of morphia was usually necessary. Bile was infected with *Bacillus coli*, and turbid and flaky in consistence.

Diagnosis.

In Case 1 local pain and fluid, seen by a shadow, showed the locality of the primary infection to be in the antrum of Highmore. Case 3 was due to a septic tonsil. Case 7 was due to a septic appendix; this case I reported many years ago.[1] The other four cases were each due to a septic gall-bladder.

The positive diagnosis of an infected gall-bladder is a matter of some difficulty when there is no previous history and no gross enlargement of the viscus. In my opinion a diagnosis can be arrived at with certainty: I run my finger down the ribs in the right mid-axillary line, remembering the intercostal nerves are at the lower border of the rib. At the seventh interspace, in gall-bladder infection, the nerve will be found to be acutely tender. We are taught that the ninth nerve supplies the bladder; my experience has been that the seventh nerve gives the signal of infection. There is frequently a referred pain to left of middle line of the abdomen. There is hyperæsthesia of the skin corresponding to Mayo Robson's point; this area is sometimes no larger than a horse bean. The skin over the upper segment of the right rectus is also acutely sensitive. Murphy's sign is always present, but should not be sought until all the skin areas have been tested, as the necessary manipulation destroys the minute tactile sensitiveness. Cases 2, 5, and 6 demonstrated in a classical manner this sign and hyperæsthesia of the skin, their previous history in no way suggesting anything wrong in the liver area. In elderly people slight yellow pigmentation of the conjunctiva behind the lower eyelid can usually be seen. An old history of flatulency is constant. The urine is high-coloured and stagnant in appearance.

CASE 1.—Male, aged 19. Distressing kidney area storm. Temperature 101° F. Draining through nose and washing out antrum of Highmore relieved all kidney symptoms at the end of 48 hours.

CASE 2.—Female, aged 22. No previous history of any kind of illness. Acute kidney area storm. Temperature varied from 101° to 104° F. Hæmaturia. Gall-bladder drained on ninth day, after which all acute symptoms subsided at the end of 36 hours.

[1] THE LANCET, 1909, ii., 1469.

CASE 3.—Male, aged 65. Kidney area storm; septic left tonsil. Declined any surgical interference; submaxillary gland enlarged and tender; has become emaciated; after three months the urinary symptoms subsided. Temperature always subnormal.

CASE 4.—Male, aged 56. Kidney area storm, not so violent as the other cases. Old history of gall-stones; gall-bladder greatly dilated: no biliary pain. Temperature 100°–101·6° F. Declined operation. Developed septic iritis. At the end of four months apparently well, except for permanent adhesions of left iris. Gall-bladder remained dilated.

CASE 5.—Male, aged 42. Acute kidney area storm; pyrexia, 100°–102° F., and hæmaturia; previous history of flatulent dyspepsia. Mr. Frank Kidd examined urinary tract with negative result. Drained gall-bladder; bile very black. All acute symptoms subsided in 48 hours.

CASE 6.—Male, aged 61. Acute kidney area storm; pyrexia, 101°–103° F., marked hæmaturia. No previous history of illness except flatulent dyspepsia and two kidney storms. Gall-bladder opened; 28 large stones removed. Acute symptoms subsided in 48 hours.

CASE 7.—Male, aged 44. Pyrexia, 101°–104° F., marked hæmaturia and frequency of micturition. Appendix removed and abscess drained. Symptoms disappeared in four days.[1]

Remarks.

In this class of case the objective kidney symptoms may be the downfall of the careless clinician. The kidneys are protesting against the amount of septic material they have to deal with; they bleed, and become painful and irritable, just as the heart does in certain cases of cancer when infection has become general. They have to let through their filtration mechanism organisms that irritate the whole renal area. Drugs are useless; the septic focus must be discovered, and my cases demonstrate a few of the many areas that may be the source of trouble. I suggest pyelitis is a symptom and in no case a primary disease.

Medical Societies.

ROYAL SOCIETY OF MEDICINE.

SECTION OF THERAPEUTICS AND PHARMACOLOGY.

A MEETING of this section of the Royal Society of Medicine was held on Oct. 10th, when Dr. W. LANGDON-BROWN delivered the presidential address on

The Problems of Asthma.

He said that these problems had now revealed themselves as involving subjects of topical interest: psycho-therapy, sensitiveness to foreign proteins, vagotonia, and endocrine balance. There was a tendency on the part of enthusiastic workers in one of these fields to neglect the other aspects. Successful treatment involved them all. He had previously attempted to express asthma in a formula. Dr. A. F. Hurst had recently improved upon that formula, defining asthma as due to an unstable or irritable condition of the bronchomotor portion of the vagus nucleus which caused it to react unduly to psychical or peripheral stimuli, or to foreign proteins in the circulating blood. This, Dr. Langdon-Brown thought, might be still further modified by including the vasomotor turgescence which accompanied the bronchomotor spasm. This was always present and was sometimes a striking feature of an attack. Further, it was controlled by the same vagal mechanism. In the asthmatic the vagus nucleus, when subjected to psychical stimuli, peripheral stimuli, or the stimulus of foreign protein in the blood, reacted by producing bronchomotor spasm and vasomotor turgescence.

Psychical Stimuli.—These stimuli were well known to produce asthma in neuropathic families. The paroxysm excited by an artificial flower figured in every text-book. Asthmatics also were known to be unusually suggestible. It was extraordinary to witness the almost instantaneous relief that might follow a hypodermic injection of distilled water into a patient who was anticipating one of adrenalin, when that drug was known to be efficacious. Those facts were well known, but what was not so clearly recognised was that the effective stimulus often arose from a psychic conflict: such a conflict might express itself at the psychic level as an obsession or phobia, at the sensorimotor level as a paralysis or tic, while at the visceral level it might appear as glycosuria, exophthalmic goitre, or asthma.

Peripheral Stimuli.—The influence of eye-strain, hay fever, sinus infection, gastro-intestinal disturbances, and uterine disorders were recognised. He would add enlarged bronchial glands to this list, and suggested this explanation of the liability of healed tuberculosis to excite asthma in susceptible subjects.

Foreign Proteins.—From the welter of amino-acids resulting from disintegration of food proteins in the process of digestion, each animal had to build up its own specific tissues. To some foreign proteins we are naturally immune—i.e., we can assimilate them automatically; to others we acquire immunity. But to still others we have neither congenital nor acquired immunity; the tissues continue to resent their intrusion. Such proteins excite anaphylaxis, which Richet had defined as "the last stand of the race against adulteration of its protoplasm." In extreme degrees anaphylactic shock was fatal, but in lesser degrees anaphylaxis was a violent attempt of the body to get rid of the foreign invader. As Drury had expressed it, "The toxic idiopathies were conservative self-repairing mechanisms under parasympathetic control."

The Influence of the Parasympathetic.—The main function of the parasympathetic might be defined as promoting the assimilation of suitable and the rejection of unsuitable material. Thus it starts the secretory and muscular processes of digestion, and could reject food by vomiting. In bronchial catarrh the cough similarly got rid of unsuitable material. Confronted with an irrespirable gas, the vagus checked its entrance to the lungs by laryngeal spasm. Bronchomotor spasm could not be explained in quite the same way, since it did not prevent the entrance of unsuitable material although tending to interfere with elimination, but Dr. Langdon-Brown thought it was an example of that exaggerated response which was typical of pathological states. He agreed with Eppinger and Hess to the extent that the asthmatic is a vagotonic.

The Sympathetic and Endocrine Balance.—One of the greatest gaps in our knowledge was our ignorance of the part played by the endocrine glands in immunity. He felt that further research would show that just as anaphylaxis is associated with vagotonia, so the opposite condition of sympatheticotonia would be found to be related to immunity through the endocrine system. The over-activity of the broncho-constrictor fibres of the vagus was kept in check by the broncho-dilator action of the sympathetic. Hence the effect of an injection of adrenalin, or of fright, in checking an attack of asthma. The reinforcement of the adrenalin effect by pituitrin pointed in the same direction. The glands which coöperate with the sympathetic generally appear to help in checking the asthmatic paroxysm.

Asthma, Anaphylaxis and the Skin.—The skin undoubtedly had excretory functions. The rashes of the exanthemata were compared to that produced by serum in anaphylactic subjects. Dr. Langdon-Brown had occasionally seen alternation of attacks of asthma and eczema, and in one family-tree this alternation in different members of the family was very striking.

Treatment.—The above considerations would help to provide a rational explanation for the methods of treatment used empirically in the past. It was necessary to make an all-round assault on every case of asthma, and not to regard the disease as being either of purely psychological or of purely toxic origin.

The suggestibility of the patient should be used to help him confidently to expect a cure. Search should also be made for deep-seated psychological troubles. Sources of peripheral irritation must be eliminated. This included avoidance of late suppers and of cold bedrooms. The skin reactions he had found very helpful in determining the foreign proteins to which the patient was susceptible. When the offending protein thus discovered could not be eliminated, we should consider what methods of desensitisation were feasible. He added that in his experience it was important to exclude the syphilitic toxin as the offending protein. The universal belief in the efficacy of the belladonna group in asthma found its justification in the paralysing effect of those drugs on the parasympathetic ending, just as the fillip given to the sympathetic by adrenalin or cocaine helped to redress the balance in another way. The influence of iodide was also comprehensible if we accepted the theory that its action was mainly to activate the thyroid. This all-round attack on asthma should be made before such structural changes as emphysema have occurred, for then a vicious circle was established which was hard to break.

Discussion.

Mr. W. F. COKE emphasised the danger that lay in regarding all cases of asthma as being psychic in origin. He had recently seen a case which had been tentatively diagnosed as general paralysis of the insane. The skin test, however, showed that the patient was sensitive to potato protein, and the removal of potato from his diet produced an absolute cure. In another case, that of a small boy, asthmatic attacks occurred when he went to stay with relatives who kept dogs. Mr. Coke thought every case of asthma should be tested with protein.

Dr. CRICHTON MILLER remarked on the thoroughness and lack of bias towards one particular point of view, with which the President had discussed the problem of asthma. He would like to emphasise two points in the causation of asthma: on the endocrine side adrenalin insufficiency, and on the psychic side the fear-complex. In asthma there was an upset in the adrenalin and fear mechanisms; the same also occurred not infrequently in mucous colitis.

Dr. C. O. HAWTHORNE congratulated the President on his masterly review, which was typical of that new and hopeful phase that medicine has entered upon during recent years—hopeful because we were now dealing rather with the causes of symptoms than with the symptoms themselves, so that treatment was being carried out upon a rational basis.

Dr. A. LAPTHORN SMITH believed that eclampsia and asthma exhibited certain similarities, and that both were due to poisons in the blood. For both diseases he had found treatment with large doses of potassium bicarbonate very efficient.

Dr. T. IZOD BENNETT read a paper on the

Modifications of Gastric Function by Means of Drugs.

He said that in no branch of medicine was the difference between the list of remedies used in practice, and that approved by pharmacologists as having definite actions, more noticeable than in the branch which dealt with gastric disorders. Recent researches did allow us to point to certain substances as being proven experimentally to have definite effects, and they might best be classified into (1) those affecting gastric secretion; and (2) those affecting gastric motility.

1. *Substances Affecting Gastric Secretion.*—(*a*) Diminishing gastric secretion: *Atropine.* Medical literature showed an entire lack of agreement as to the potency of atropine in arresting gastric secretion, but the speaker had found its effect to be very marked. Especially was this so if the drug were used as a wash to the mucous membrane; curves of fractional gastric analyses were exhibited illustrating this; and the speaker gave it as his opinion that the effect of weak atropine solution on the gastric mucosa was as powerful as its effect when applied to the eye. In practice he had found atropine in great dilution a valuable remedy when given on an empty stomach. (*b*) Increasing gastric secretion: *Pilocarpine* applied locally was correspondingly less effective, because though, as shown by fractional gastric analysis, it excited secretion by the gastric glands, it was rapidly absorbed, and would then cause profuse salivation which frequently diluted the total gastric contents and so lowered their acidity. (*c*) Substances affecting the gastric secretion after its evolution: Substances neutralising acid secretion. Having referred to the controversies as to the actual effects of the alkaline salts in cases of hyperacidity, the speaker showed curves of fractional gastric analysis which demonstrated the increase in secretion produced by bicarbonate, and the complete but temporary neutralisation produced by magnesium hydroxide if administered after a meal. Summarising the results of recent experimental work, he said: (1) That sodium bicarbonate tended to excite the gastric mucosa to increased secretion and that this effect more than counterbalanced its neutralising effects; (2) that magnesium hydroxide and bismuth carbonate were less stimulating and stronger in their neutralising effects; (3) that all such salts should be given after meals; (4) that for arresting secretion atropine was much the most effective substance; (5) that the true indication for sodium bicarbonate was in those cases with low acidity which show an excessive secretion of mucus.

2. *Substances Replacing Deficient Acid Secretions.*—Dr. Bennett referred to the functions of hydrochloric acid in the stomach, and pointed out the necessity of giving large doses if an effect were to be produced. Recent work has shown that in normal circumstances any added HCl is neutralised by duodenal regurgitation. Reference was made to the very potent action of HCl on bacterial growth. Having briefly referred to modern work on the bitters, which has failed to show any gastric effects from these substances, the speaker discussed drugs which might influence gastric motility. He said that atropine did not usually produce any marked effect, but that in cases of gastric spasm it might be of great use. He compared its action in such cases to that of the digitalis series when they were employed for producing heart-block and checking tachycardia in cases of auricular fibrillation. For increasing gastric motility pilocarpine had been employed, but its effect was not marked unless dangerous doses were employed. The recent work of Berti on strychnine was then described, a series of radiographic tracings being shown which demonstrated the effects of this drug on the stomach. Only in very small doses, less than 1 mg. by mouth, could this drug be shown to cause more rapid emptying of the stomach; in larger doses an initial increase in peristalsis was followed by rapid tiring, with production of spastic contraction in the pyloric region. With large doses hour-glass constriction of the stomach was produced. The speaker emphasised the importance of employing only small doses of this drug in gastric cases.

In conclusion, reference was made to a series of experiments with adrenalin; although emotional states such as fear could readily be demonstrated to delay the emptying of the stomach, the speaker had been unable to produce such effects with adrenalin. A large number of observations had been made, the drug being given both hypodermically and as a wash, but the effects both on gastric secretion and gastric motility had been negative.

Discussion and Reply.

The PRESIDENT was glad to find that some drugs did affect gastric secretion. It was interesting to know that sodium bicarbonate had, in fact, the action which on clinical grounds it was always supposed to possess, until Pavlov's time. The better effect of magnesia as a neutraliser of gastric acidity was also interesting.

Dr. G. GRAHAM remarked that the curves illustrating the actions of sodium bicarbonate and of magnesia

were not truly parallel since the former was given before a meal and the latter after a meal.

Dr. P. HAMILL thought that when patients consistently stated that mixtures containing gentian improved their appetite there must be some action. He was careful to avoid an element of suggestion and could only ascribe the improved appetite to a definite therapeutic action of gentian. Clinically, he found atropine very useful, and the quantity of this drug required was exceedingly small when the stomach was empty. His ward sisters always stated that the administration of adrenalin caused constipation. He therefore thought that further observations on the action of adrenalin in the intestine might be useful.

In reply, Dr. BENNETT said that he had truly parallel curves of the action of magnesia and of sodium bicarbonate administered both before and after meals, which showed that magnesia was more effective in neutralising gastric acidity, although the difference in action was more striking after meals.

CARDIFF MEDICAL SOCIETY.

A MEETING of this society was held on Oct. 10th, the chair being taken by Mr. W. MARTIN.

Dr. W. PARRY MORGAN read a paper on

Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis.

He pointed out the unanimity with which those who expressed their views on the treatment in the report of the Committee of the Medical Research Council praised the treatment, but noted that there was not the same unanimity as to which were suitable cases. Some advocated it only as a last resort, an extraordinary attitude towards an admittedly successful method of treatment. Dr. Morgan gave reasons for the limited application of the method; he thought that the treatment should be commenced earlier than was usually the case. Complete collapse was not then necessary, for the gas in a partial collapse gave differential rest to the affected inelastic part of the lung, while the normal portions continued to expand freely as before. He compared artificial partial pneumothorax with the spontaneous collapse due to fluid or leakage from the lung, and pointed out that although the collapse was temporary in these cases, it was often followed by good results. Good results might thus also be expected from temporary artificial collapse, and certain recent publications supported this view. These also showed that the objection to the production of an early artificial collapse—viz., that it was nearly always followed by adhesions—did not hold in the case of partial collapse, as adhesions did not, as a rule, follow, nor did fluid appear, provided the intrapleural pressure was always kept negative. The treatment, therefore, was applicable to both sides of the chest at one and the same time.

Dr. Morgan also described the two-manometer apparatus for performing the operation, and insisted that the alleged complication attending its use was more apparent than real. The only differences between this and the single-manometer apparatus, such as that used by Dr. C. Lillingston and Dr. Vere Pearson, were: (1) That, instead of a clip to shut off the gas, there was a contrivance by means of which the gas could be cut off very gradually; when this was done, the pressure in the manometer gradually fell from that in the reservoir to that in the pleural cavity, instead of being either the one or the other. (2) That a second manometer was introduced, which merely registered the reservoir pressure, whether the gas flowed or not. He showed that the physical conditions obtaining in the chest could be reproduced by the use of a rubber-stoppered bottle with the bottom cut out, filled with water, and inverted into a bowl of water. By means of this device he was able to demonstrate the details of the operation, and to show clearly the advantages of the apparatus.

Reviews and Notices of Books.

EXPERIENCES OF AN ASYLUM PATIENT.

London: George Allen and Unwin. 1922. Pp. 190. 5*s*.

Twenty-two years ago a lady whose husband, a medical man, had died under tragic circumstances was persuaded by her relatives to become a voluntary boarder at Cheadle Royal Asylum. Ten days later she was certified as insane, and she remained under certificates for 12 years. An account of her experiences, embodying charges of gross ill-treatment, was published in *Truth* eight years ago. This narrative has reappeared in book form with an introduction by Dr. Montagu Lomax, which, together with an appendix containing documents relating to the case and articles in *Truth* inspired by it, occupies a slightly larger number of pages than the narrative itself. The outbreak of war in 1914 diverted public interest from this lady's case, and its republication at so late a date is considered an act of justice to herself, and is utilised as a further plea for the establishment of a Royal Commission on the Lunacy Laws and their administration. The names of all persons, and of all places except Cheadle Royal, alluded to in the book are stated to have been replaced by others.

Mrs. "Grant-Smith" complains in the first place that she was certified without her knowledge. While a voluntary boarder and under the influence of narcotics she was interviewed by two gentlemen, presumed to be the authors of two rather weak certificates (reproduced), which suggest a diagnosis of melancholia. She was not informed of what had taken place or of her right to see a magistrate, or, to be exact, she has no memory of such an occurrence. Her account of the ensuing two years at Cheadle Royal gives examples of unsympathetic treatment, but the charges of gross cruelty are levelled against two in particular of the four other institutions in which she was a patient subsquently. The fact that she was transferred a number of times is the ground of another complaint, and both she and Dr. Lomax believe the object of these steps to have been to hinder inquiry into her charges of ill-treatment. Of the latter the most sensational are that a nurse took a pair of combinations soaked with blood and urine from another patient and tied the fork round her mouth, afterwards placing the garment in her bed, that the same nurse deliberately emptied a chamber of urine over her head, and that she was at one time locked in the lavatory each day during the doctor's round in order to conceal from him the bruises on her face which had been inflicted by nurses. Charges are also made of punitive purging and drugging at the discretion of nurses, and of various other forms of ill-treatment or neglect. Mrs. Grant-Smith wrote habitually to the Lord-Chancellor of these abuses, and asserts that the inquiries which resulted were perfunctory and prejudiced. Finally, after a year in an institution of which she makes no complaint beyond that of unjust detention, she was allowed to consult Sir George Savage and Dr. Percy Smith in London, each of whom pronounced her free from such signs of insanity as would have justified her certification at that time, and to their opinions she appears to owe her freedom. A private letter from Dr. Percy Smith to Sir George Savage is reproduced in the text, and a footnote by Dr. Lomax excuses this breach of etiquette on the ground that the letter represents an opinion for which Mrs. Grant-Smith paid.

The chapters that Mrs. Grant-Smith has written are not a consecutive account of this period in her life, but a series of impressions in which a few details are clear and the background vague or indistinguishable. So incomplete and confused is her narrative that it is impossible at any given stage to deduce her status as a patient and the degree of freedom and comfort that her conduct permitted. At "Barkington," for example, she lived in an evil-smelling ward with patients "two of whom were very dirty and always left wet," but she received "frequent invitations to

play golf with the Medical Superintendent " and to go out with his wife. It is from isolated facts such as these that any impression of her life has to be gained. Nor are any general particulars given of the institutions concerned, of their size, construction, or fees, or of the opportunities afforded in them for occupation and amusement. There is strong presumptive evidence in her own story that Mrs. Grant-Smith was at one period insane. For any other conclusions of importance the evidence in the book is wholly insufficient. There are singular omissions apart from those in the narrative. Mrs. Grant-Smith has two brothers who are medical men, one of them having considerable experience in lunacy. What have they to say of her story? Again, not even anonymous support of the allegations is produced from the pen of those kind-hearted nurses who are said to have sobbed inarticulately when she was transferred to another ward or asylum.

It is an impossible task to weigh the evidence presented in this book with any certainty of arriving at the truth. Dr. Lomax believes the story " down to its most trivial detail," arguing its truth from the fact that Mrs. Grant-Smith's memory of these events has persisted in the same form since her recovery. This is no valid argument, for patients who have made totally unfounded accusations of ill-treatment during a temporary period of insanity not uncommonly persist in them indefinitely. Mrs. Grant-Smith may have had just cause for complaint in the manner of her certification, but it is regrettable that Dr. Lomax should use this circumstance to foment prejudice against the proposed reception of voluntary boarders in county asylums. It is possible that she was treated with some lack of consideration by certain nurses and doctors; it is, we think, impossible that the acts of gross ill-treatment described ever occurred. Meanwhile it is unfortunate that the public should again be asked to believe that asylums are " hells on earth." Whatever the proportion of truth may be in this book, it gives a grossly misleading impression of the way in which the insane are treated in this country at the present time.

RADIATION THERAPY.

The Principles of Physics and Biology of Radiation Therapy. By Dr. BERNHARD KROENIG, Professor of Gynæcology and Obstetrics, &c., University of Freiburg im Breisgau; and Dr. WALTER FRIEDRICH, Chief of Division of Radium Therapy, University of Freiburg. London: William Heinemann. 1922. Pp. 271. 42*s*.

THIS translation of the work of Kroenig and Friedrich will enable readers to become acquainted with a very important contribution to radiology, viewed either from the physical or the medical aspect. The work is the outcome of an intimate collaboration between a medical man and a physicist, and the result is a mass of experimental work of significance and wide interest for both. Dr. Friedrich is a physicist whose qualifications for the investigations here detailed cannot be doubted; his association with Prof. Laue, in the first successful attempt in the determination of the wave-length of X rays by crystal methods, is well-known; from these researches he has gone on to these detailed and elaborate measurements upon X rays and the kindred radiation from radium in the passage through the tissues of the body. How complex are the resulting physical phenomena is gradually unfolded as more and more difficult problems are dealt with. They leave one with the impression that the intricacies of the biological effects of the radiation are not alone dependent upon the varied aspects of cell life, but also to a considerable extent upon the innumerable differences of a physical nature which may be set up in such tissues, according to the manner in which the radiation is dispensed. The experimental questions dealt with in this book are mainly of a fundamental character; there is singularly little side-tracking, though there is no lack of detail. To these authors and to Dessauer we owe the proof of the important part which purely scattered radiation may play in determining the intensity, and hence the dose of radiation received by a mass of tissue at some depth below the surface. With physical data to support them the authors attack the problem of the dependence of the biological effects upon variations in the dose of radiation. These variations are very numerous. A dose may vary in the product of intensity and time; it may vary in the way in which this quantity is spaced—i.e., whether the total radiation is delivered at one sitting or spaced over a considerable time interval; it may vary with the wave-length of the radiation employed, and so on. These possibilities are all considered and experiments devised for their solution. It would be going too far to say that all these questions have been answered; this would imply that safe generalisations may be made upon the relations existing between the energy equivalent of a dose of radiation and the biological responses of a complex such as living tissue. The subject has not reached that stage, nor would the authors consider that it has, but there is an air of finality about the way in which some of the conclusions are stated that might give this impression.

The book is a valuable one and can hardly be read without profit by physicists and radiologists. The translation on the whole has been well done, though it is a little un-English in parts. The letterpress, diagrams, and coloured illustrations are almost without exception of a very high level.

AN ATLAS OF SKIN DISEASES.

Hautkrankheiten und Syphilis im Säuglings- und Kindesalter. Ein Atlas. By H. FINKELSTEIN, E. GALEWSKY, and L. HALBERSTAEDTER. Berlin: Julius Springer. 1922. With coloured plates. Pp. 77.

THIS book should be of great value to the specialist in pædiatrics and to the dermatologist for illustrating lectures to students. The coloured plates are extremely clear and life-like. Particularly good are those depicting erythema multiforme, pemphigus neonatorum, seborrhœic eczema, and the various syphilitic rashes. Those illustrating the characteristics of the teeth in congenital syphilis and in rickets are also well chosen. The plate of molluscum contagiosum is hardly distinct enough, for it does not show the central depression in the lesions, and it would have been better had the face, rather than the arm, been taken to illustrate the various changes that occur in the skin in xeroderma pigmentosum. The descriptions of diseases in the first part of the book are adequate, and the directions for treatment, though brief, are practical and, on the whole, up-to-date.

CLINICAL DIAGNOSIS.

By ALFRED MARTINET, M.D. Paris. With the collaboration of Drs. DESFOSSES, G. LAURENS, LÉON MEUNIER, LUTIER, SAINT-CÈNE, and TERSON. Authorised English translation from the third edition by LOUIS T. DE M. SAJOURS, B.S., M.D. Philadelphia: F. A. Davis Company. 1922. In two volumes. Pp. 1388. $14·00.

THIS work, in two volumes, is divided into three parts. Part I. deals with general considerations on diagnosis, philosophical and historical. Ignorance, gross or relative, faulty examination, and errors of judgment are given as the commonest causes of mistaken diagnosis, one of the more uncommon being " pride and vanity." The second part is devoted to the technical procedures of diagnosis. The section on the examination of the digestive tract is written with the collaboration of Léon Meunier and Lutier. This is one of the best chapters in the book. Most of the procedures are those of Dr. Meunier himself; amongst them, an easy method is detailed for estimating the digestive activity of the stomach, also a simple way of differentiating a gastric from a duodenal ulcer. The examination of the circulatory and of the respiratory systems are considered in

detail, and the illustrations are a useful feature of this section. The author has had the help of Dr. Saint-Cène in the chapters on the genito-urinary tract, in which, as elsewhere in the book, all tests are described carefully; for this we may be grateful, since in many cases they differ from those in ordinary use in this country. Sections are devoted to the examination of the nervous system, including the cerebro-spinal fluid and special sense organs, the skin and appendages, parasitology, bacteriological technique, and spectroscopic examinations. Part III. in the second volume deals with the symptoms most frequently encountered in practice; these, with their anatomical and physiological features, have been set out alphabetically, and where necessary a short summary has been given at the end of each section. The volume ends with an index of the principal clinical signs and syndromes arranged according to the names of the authors concerned. Starting with the Abderhalden Reaction, and continuing through ten pages, the list ends with Woillez's Disease.

These two volumes reflect great credit on the author and his collaborators. The book will prove a valuable addition to a working library of clinical medicine, and will appeal to practitioners.

TUBERCULOSIS IN INFANCY AND CHILDHOOD.

By J. CLAXTON GITTINGS, M.D., FRANK C. KNOWLES, M.D., and ASTLEY P. C. ASHHURST, M.D. London and Philadelphia: J. B. Lippincott Company. 1922. With 23 illustrations. Pp. 273. 21*s.*

THIS work is based upon a course of lectures delivered at the Children's Hospital, Philadelphia, under the auspices of the Philadelphia Pediatric Society. The sphere and the standard of the lecture and of the printed book are not identical, and to convert the one into the other is a risky experiment even when the conversion is carried out with great care. This does not seem to have been exercised here; slipshod and slapdash, the book is disappointing from most points of view. The names of even well-known authorities are mis-spelt, and it is only from the context that the reader can guess who are Nagele, Romer, and Bock, and many examples of thoughtless diction might be quoted. With regard to the treatment of Pott's disease, the authors show little knowledge and less appreciation of Albee's bone-grafting operation with which many American and German surgeons are at present greatly intrigued. As for the treatment of cold abscesses, the old method of free incisions is preferred to the modern one of aspiration. Even the indexing shows signs of slovenly work, and the whole production will hardly appeal to any section of the medical public.

LES DIARRHÉES CHRONIQUES.

By LOUIS TIMBAL, Préparateur à la Faculté de Médecine de l'Université de Toulouse. Paris: Masson et Cie. 1922. Pp. 267. Fr.12.

IN this well-arranged and inexpensive volume Dr. Timbal gives a complete résumé of the views of the French school of medicine on the various forms of diarrhœa and their treatment. He says that his chief object is to emphasise that diarrhœa is merely a symptom; possibly the issue of a whole book on the subject is not the best way of conveying such an idea; but the matter is so well set out and the volume so complete that we have nothing but gratitude to its author.

The section dealing with the laboratory examination of the fæces, based upon the well-known work of Dr. René Goiffon, should remind us of the utility of this form of investigation, which has fallen into some neglect in England in recent years. The chapters dealing with diarrhœa due to parasitic infection are especially good, the sub-tropical climate of the Midi, and the proximity of their African colonies having given our French colleagues exceptional experience in this branch of medicine. It is interesting to note the importance attached to lamblia infections; and the author's warning as to the resistance to treatment of all amœbic dysenteries is quite opportune at a time when such diseases have become more common in this country. Dr. Timbal appears to accept Cannon's work on the acid-control of the pylorus more whole-heartedly than do many modern physiologists, and his general views as to gastric function do not seem to be in complete accord with the most recent work: thus on p. 84 he asserts that the healthy stomach is always completely empty in the morning.

Apart from these minor points the work is excellent.

THE LEGACY OF GREECE.

Edited by R. W. LIVINGSTONE. Oxford: At the Clarendon Press. 1921. Pp. 424. 7*s.* 6*d.*

THIS excellent little book consists of a series of essays by various writers, including Prof. Gilbert Murray, the Dean of St. Paul's, Sir T. L. Heath, Prof. D'Arcy W. Thompson, Dr. Charles Singer, Mr. R. W. Livingstone, Prof. Percy Gardner, and Sir Reginald Blomfield. Prof. Murray, in his opening essay, shows the value of Greece to the future of the world, and the Dean of St. Paul's writes on Greek religion and the debt which Christianity owes to it. Of the essays which appeal most to our particular field of knowledge Prof. D'Arcy Thompson's stands first, where he deals with Aristotle and his achievements in science, with numerous general allusions to Nature and natural history and science in Greek literature. He lays special stress upon Aristotle's knowledge of marine fauna; among other matters he was cognisant of the curious method of generation of the octopus—namely, hectocotylisation, which has only lately been rediscovered. Prof. Thompson brings out in the most delightful way Aristotle's knowledge of fishes, such as the nest-building wrasse, to which a parallel exists among fresh-water fishes in our own common stickleback; his knowledge of eels and their larvæ, which eventually become "elvers" and which have only recently been identified by Prof. Grassi and others; his knowledge of insects and his great physiological treatises—e.g., the De Generatione Animalium. Surely, when Prof. Thompson says (p. 149), "We are deluded by the likeness between a wasp and a hover-fly, a merlin and a cuckoo," he meant to write "sparrow-hawk," and not "merlin." Despite his apology on p. 161, Prof. Thompson's essay is of all the essays in this book, except possibly Mr. Livingstone's on Greek literature, the one most calculated to make the average man desire a knowledge of Greek, if not language, at least learning and literature. Sir Thomas Heath, who has recently edited Euclid, Bk. I., in the Greek, writes about Greek mathematics and astronomy, and incidentally shows how almost all mathematical terms are Greek, or Latin derived from Greek—for example, "subtend"—and how much more easy they are to remember and understand if the learner has some knowledge of the Greek language. Dr. Singer's papers on Biology and on Medicine are full of interest, as are Prof. Gardner's upon the Lamps of Greek Art and Sir R. Blomfield's upon Architecture. Mr. Livingstone writes on Greek literature with that love and understanding of his subject which might be expected from the author of "A Defence of Classical Education."

The whole book is a small one; the essays are short, but we can say of them as Meleager said of Sappho's poems: *βαιὰ μέν, ἀλλὰ ῥοδα*,—they are little, but all roses.

JOURNALS.

JOURNAL OF PATHOLOGY AND BACTERIOLOGY. October, 1922.—The Experimental Production of Tar-Sarcoma in Mice and Rats, by B. R. G. Russell. Repeated subcutaneous inoculations of tar into a number of rats and mice led to the growth of a transplantable polymorphic-celled sarcoma in one animal of each species. A parallel is thus provided with the carcinomata which may be produced by the application of tar to the epidermis.—Partial Activity

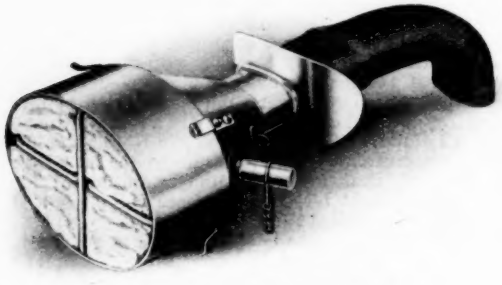
of the Kidney and the "All or Nothing" Principle, by V. R. Khanolkar. An annotation on this subject appears in another column.—On Lipoid Degeneration of the Kidney and the So-called "Myelin Kidney," by J. W. McNee. The author describes three examples of myelin kidney, a special form of fatty degeneration in which cholesterin-ester fat is present, mostly in the interstitial tissue of the cortex, in such large amounts that the organ has a characteristic naked-eye appearance. In all cases there was present a late stage of intracapillary glomerulitis, with commencing fibrosis and tubular degeneration. The myelin kidney contains also a small amount of glycerin-ester fat, of which the large white kidney has much, with a trace of the doubly-refracting cholesterin esters.—Observations on Experimental Intestinal Tuberculosis: the Effect of Treatment with Naphthalene Emulsion, by T. Redman. Intestinal infection can be established in guinea-pigs with certainty by feeding them with one or two doses of heavily-infected human sputum in a bran mash. The subsequent administration of naphthalene emulsion may in the early stages eradicate infection altogether, and in any case will much diminish its intensity and rate of progress.—Studies in Respiratory Infections in Southern Australia: the Pneumococcus and other Members of the Viridans Group of Micrococci, by S. W. Patterson and F. E. Williams.—The Routine Preparation of Diphtheria Toxin, by P. and O. M. Hartley. Some of the factors needing control are the brand of peptone used for the broth, its concentration, the initial reaction of the medium, and the amount of heating in sterilisation; but with every attention to details it still seems impossible to guarantee uniformity.—Toxin and Reaction Changes Produced by the Diphtheria Bacillus in Culture, by P. and O. M. Hartley. Toxin is at its maximum when the reaction has come to be between 7·8 and 8·2, but the rule is not simple.—The Value of Douglas's Medium for the Production of Diphtheria Toxin, by P. Hartley. A medium made from trypsinised horse flesh yields potent toxin which keeps well.—The Diameters of Red Cells in Pernicious Anæmia and in Anæmia following Hæmorrhage, by C. Price Jones.—Studies in Group-agglutination: the Salmonella Group and its Antigenic Structure, by F. W. Andrewes. The author points out the great advantage of using monospecific sera for identification of these closely allied organisms; this is readily prepared in bulk by absorbing the group-agglutinins with the related strains. Sera showing group-agglutination are provided by those prepared with these allied bacilli. If a number of colonies are picked off an ordinary plate-culture of, e.g., paratyphoid it is generally found that they fall into two sharply defined groups, one of which reacts well with the homologous monospecific serum, while the other agglutinates better with the group serum. The agglutinative vagaries of the ordinary cultures are thus due to it being composed of a mixture of different organisms. These characters may or may not persist on subculture. For serum diagnosis formalised emulsions should be made from colonies which do not give group-agglutination.—The Periodic Opacity of Wassermann "Antigen" in Progressively Increasing Concentrations of Sodium Chloride, by J. Holker.

New Inventions.

A COMBINED ANÆSTHETIC MASK AND AIRWAY.

THE apparatus here described is designed to minimise the risk of infection of the lungs from the nose, mouth, or pharynx. It is particularly useful in the presence of acute or subacute catarrhal conditions and for patients who have been exposed to influenza or other contagious diseases. As will be seen from the illustrations, which show the instrument ready for use and also taken apart, it consists of a large oral airway, a funnel-shaped mask, and a gauze carrier. The airway is designed to ensure that all the air inhaled by

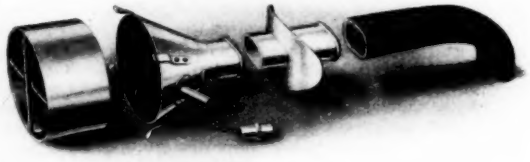
FIG. 1.



The instrument ready for use.

the patient passes through it. There is a metal shield to fit over the lips which prevents air from being sucked in at the side of the tube, the rubber portion of the airway holds up the soft palate and arrests nasal breathing, while the rubber tube can be adjusted on the metal portion so that the inner opening of the airway is just over the glottis. The mask has an internal tube to prevent surplus anæsthetic liquid from running down the airway, and a side tube is provided for oxygen or attachment to a Junker's or Shipway's apparatus, or to Pinson's ether bomb. The gauze carrier should be filled with gauze, but it should not be packed too firmly. For induction, the narrow part of the mask may be inserted between the teeth and the patient instructed to breathe through the mouth. When the pharynx is judged to be insensitive, the airway is inserted and the mask fixed

FIG. 2.



Taken apart.

on to the airway. This is a slow method, but is useful if there be catarrh of the nasal passages. However, for most patients it is quite satisfactory to induce with an open mask in the usual way and, as soon as the cough reflex is abolished—i.e., when the danger of aspiration occurs—insert the airway and mask. It is advisable to leave the airway in until, at the end of administration, the patient coughs it out.

This apparatus possesses the following advantages: (*a*) The risk of infection from the nose or the mouth is diminished; (*b*) fatigue is lessened by the free unembarrassed respiration; (*c*) less ether is required; (*d*) the face and the eyes are not covered, so that the patient's colour and reflexes are under constant observation; (*e*) the mask does not slip off the face and is well clear of the surgeon during operations on the neck; and (*f*) ether is rapidly eliminated after the operation, and cyanosis from swallowing of the tongue is prevented. The apparatus has been made for me by Messrs. Philip Harris and Co., of Edmund-street, Birmingham.

HENRY FEATHERSTONE, M.B., B.Ch. Cantab.
Birmingham.

THE LANCET.

LONDON: SATURDAY, OCTOBER 21, 1922.

The Culture of Tissues In Vitro.

THE interrelationship of different tissues in the body is one of those problems of integrative physiology which professional physiologists seem content to leave to the investigation of workers in other fields—to the zoologist, the histologist, the pathologist, and also to the clinician. Why does the epithelium of the skin grow when an incision has been made and why does it stop growing when the covering epithelium has established itself in its original form? To the surgeon the importance of this problem is obvious and to the pathologist its interest lies mainly in its application to the cancer problem. For one of the numerous hypotheses advanced to explain cancer states that the cancer cell is a normal cell which has escaped from the control of the connective tissue. What, then, is the nature of this hypothetical control? To this question recent work by the method of in vitro culture has given a clear and interesting answer. When tissues are cultivated in vitro both the associated epithelial cells and connective tissue cells proliferate in such a way that the epithelial cells retain in their arrangement the character of the original tissue: gland cells are arranged in acini, kidney cells show tubules, skin cells keratinise. CHAMPY succeeded in eliminating from such cultures the connective tissue element, and found that then the epithelial cells grew in an even sheath without exhibiting the specific arrangements or changes characteristic of the different tissues. In other words, they showed a "loss of differentiation." This so-called "loss of differentiation" is of interest to the pathologist, because it is exhibited in vivo by the cells of malignant new growths, and a considerable importance has been attached by some authorities to the presence of this change in the cancer cell. But this expression "loss of differentiation" is a misnomer, and the cells do not really lose any property at all. For DREW[1] recently showed that these undifferentiated cells when cultivated in vitro resume at once their differentiation when connective tissue is added to them. Skin cells keratinise, kidney cells form tubules, and even the cells of a mammary adeno-carcinoma, which without connective tissue had ceased to show an adenomatous structure, resumed an alveolar arrangement on the addition of connective tissue cells. We may therefore look upon the so-called "loss of differentiation" of cancer cells as indicating a loss of control of the connective tissue over the epithelial cells. But it is not in itself an expression of the cancerous degeneration; any normal cell will exhibit this change if it is made to grow in the absence of connective tissue. Quite recently EBELING and FISCHER[2] in America have repeated and confirmed DREW'S observations. They deny that loss of differentiation occurs, as CHAMPY found, but the apparent discrepancy of results is due to the fact that they use the term "loss of differentiation" quite unjustifiably as meaning the actual transformation of epithelial cells into connective tissue cells.

When these findings are applied to the conditions existing in the living organism it is necessary to realise that here connective tissue, in addition to the primary controlling function just described, has the second function of conveying to the epithelial cells the lymphatics and blood-vessels through which food material and oxygen are supplied and waste products are carried away. In vivo, therefore, epithelial cells are absolutely dependent on connective tissue cells and cannot grow without them. Experiments have recently been carried out in the surgical clinic in Marburg by Prof. HANS BURCKHARDT[3] in which he attempted to cultivate epithelial cells in vivo in animals by the implantation of skin grafts into the omentum. Like others before him he failed to obtain any extensive proliferation of the transplanted epithelium. The point of interest in his observations in connexion with the present problem is that the fate of the transplanted epithelium depended on the behaviour of the connective tissue transplanted with it. It remained alive and formed cysts if the connective tissue remained normal. But if the latter underwent fibrosis it strangulated the epithelial cells and led to scar formation.

The factors which determine the behaviour of connective tissue are unknown, though the process is one of importance, especially in connexion with cancer. For the spontaneous healing of carcinomata is, as ORTH showed many years ago, due to such a strangulation of the carcinoma cells by fibrous tissue, and W. CRAMER pointed out that in the disappearance of cancer after exposure to radium and X rays the same process, which he believed to be elicited by preceding hæmorrhages into the tumour, is involved. At present the conception of the mode of action of X rays and radium is entirely dominated by the idea that these radiations kill the cancer cell directly, and no importance is attached to the process by which the cancer cells—even those that have been killed—undergo absorption. This explanation of a direct lethal action cannot in any case be regarded as an adequate one, since tumours frequently consist of large masses of necrotic tissue without eliciting this reaction of fibrosis. The suggestion recently made by Prof. E. S. REYNOLDS[4] in THE LANCET that there is in certain individuals a fibrous diathesis might explain the occurrence of spontaneous healing of cancer, but it will not explain why the same process occurs after irradiation. It would appear that this aspect of the action of X rays and radium has been unduly neglected and would repay further experimental investigation.

Addison's, or Pernicious, Anæmia.[1]

A TRADITION has been carried on by the publication, in the July number of Guy's Hospital Reports, of a sixth consecutive series of cases of the disease now most commonly known as pernicious anæmia, originally described by ADDISON of Guy's Hospital in 1855. Since that date the record of all such cases treated in the hospital has been published at intervals by WILKS, TAYLOR, PYE-SMITH, HALE-WHITE, FRENCH, and now by CAMPBELL and CONYBEARE. The new record covers the period from 1909 to March, 1922, and comprises 75 cases. It is evident to all who have thought of, or worked at, the problem of pernicious

[1] British Journal of Experimental Pathology, vol. iii., February, 1922.
[2] Journal of Experimental Medicine, vol. xxvii., No. 3, Sept. 1st, 1922.
[3] Münchener med. Wochenschrift, Sept. 22nd, 1922.
[4] THE LANCET, Sept. 30th, 1922.
[1] Guy's Hospital Reports, 1922, ii. (fourth series), 265–301. Addison's Anæmia: A Study of Seventy-five Cases, with Some Remarks on the Pathology. By J. M. H. Campbell, M.D., Hilda and Ronald Poulton Research Fellow, and J. J. Conybeare, M.D., Astley Cooper Student, Guy's Hospital. London: Henry Frowde and Hodder and Stoughton.

anæmia, that here is a disease problem that should be capable of solution. It is interesting, therefore, while drawing attention to the paper of CAMPBELL and CONYBEARE, to remind our readers of the progress made since ADDISON'S time in the study of this so far incurable disease. That it is a hæmolytic anæmia, and that red blood cells are destroyed within the body has long been recognised, from the presence of hæmosiderin, an iron-containing derivative of hæmoglobin, in the liver, spleen, and occasionally the kidneys. It was inferred by WILLIAM HUNTER, in work published now over 20 years ago, that this distribution of iron pigment indicated hæmolysis in the portal circulation, and hence suggested that the cause of the disease might be located somewhere in relation to the intestinal tract. We know now, however, from experiments on animals, that hæmolysis anywhere within the general circulation results in a deposition of hæmosiderin in exactly the same organs. Thus there is no evidence from this direction pointing to the cause of the disease being located in the portal area or intestinal tract. There is little to cavil at in HUNTER'S inference, for it was made at a time when experimental pathology was in its infancy. There seems nowadays to be an unfortunate tendency, chiefly no doubt because of opposition to HUNTER'S theory of oral sepsis in relation to the causation of pernicious anæmia, to forget the excellence of HUNTER'S original experimental work.

Following the introduction of EHRLICH'S methods of staining, which revolutionised the study of diseases of the blood, and since the hæmolytic nature of the disease was recognised, two chief views of the mechanism of pernicious anæmia (quite apart from its ætiology) have held sway. These may be summed up very briefly as follows: 1. That the mischief arises primarily in the bone marrow, which provides imperfect corpuscles for the circulation, these cells being destroyed more easily than normal corpuscles. 2. That the changes in the bone marrow are all secondary, in response to a continual demand for new corpuscles to replace those destroyed by hæmolysis. In the first case a primary disease or damage of the bone marrow is inferred. The second view might be taken to infer that the bone marrow, harassed by the repeated demand for new corpuscles, first puts out into the circulation cells which are unripe (as occurs after any large hæmorrhage), and finally cells which are not only unripe, but of bad and hurried workmanship, deformed, and misshapen. Experimental work on animals has lent considerable support to the second view of the mechanism of the disease, so much so that it is now very commonly accepted. It must be remembered, however, that the first theory has by no means been completely disproved, and that it is far less amenable to experimental study. Hence it must not be yet altogether discarded. The support for the second view has come chiefly from experimental work with various blood poisons—HUNTER with toluylendiamine; PATON and GOODALL, PRICE-JONES, and others, with phenylhydrazine; BUNTING with saponin and ricin; MUIR and MCNEE with a hæmolytic serum; and MCLEOD and MCNEE with the hæmolysin obtained from virulent streptococci. By all of these agents, which induce hæmolysis to a greater or lesser extent within the circulation, a blood picture closely resembling that of human pernicious anæmia can be brought about within a very short time. It must be remembered that some of these poisons—e.g., saponin—damage the bone marrow severely, in addition to destroying red corpuscles in the circulating blood. The work of TALLQVIST and others on the anæmia which may result from infection with the tape-worm *Bothriocephalus latus* added a new and very important chapter to the study of pernicious anæmia—certainly the most important since the work of WILLIAM HUNTER. It was found that the anæmia which might follow bothriocephalus infection resembled pernicious anæmia in almost every way, but was cured when the cause was recognised and removed. It was found, further, that a hæmolytic lipoid substance could be extracted from the body of the worm which, in experiments on dogs, induced a fairly severe anæmia. The contribution of veterinary science to the study of pernicious anæmia must not be forgotten, although the work is insufficiently known to the medical profession. There occurs in horses a disease now actually known as "pernicious anæmia" which bears a close resemblance to the human malady. An excellent account of it has been given by SEYDERHELM,[2] who refers to numerous other investigations of the same condition. This equine disease may run an acutely fatal course of about eight days' duration, or, after an acute onset, may take on a more chronic character with remissions, just as in human pernicious anæmia. In the latter animals the blood corpuscles are greatly reduced in number, and the colour index is always greater than 1. There is anisocytosis, poikilocytosis, and polychromasia, a diminution in the number of blood platelets, and, before death, definite leucopenia. The changes in the bone marrow, liver, and spleen are practically identical with those in the human being. The interesting fact, however, is that in this disease of horses—which occurs in France and parts of Germany and America—the malady is transmissible from one animal to another by injections of blood, and the virus has been proved to pass through the pores of a Berkefeld or Chamberland filter. The virus thus belongs to the so-called "filterable viruses."

Some of the points raised in CAMPBELL and CONYBEARE'S paper are of especial interest. The colour of the skin is referred to, 60 out of the 75 cases being noted as lemon-yellow or yellow, while 2 are described as green. Four cases were definitely jaundiced, but in all of these there was absolute evidence of cholecystitis. Since the work of H. VAN DEN BERGH the lemon-yellow colour characteristic of pernicious anæmia is recognised as a real jaundice of latent type, the bile pigment in the plasma being increased too slightly, as a rule, to produce obvious icterus in the conjunctivæ or actual biliuria. This latent icterus must be accepted as an essential feature of the disease. Interesting questions arise from a comparison of pernicious anæmia with so-called acholuric jaundice. In the latter disease an increased fragility of the red corpuscles has been recognised, which is absent in pernicious anæmia. CAMPBELL and CONYBEARE define pernicious anæmia as a severe anæmia with a colour-index of over 0·6. Quite apart from the difficulty in avoiding individual inaccuracies of observation among a series of cases extending over 12 years, it does not seem that the occurrence of a colour-index so low as 0·6 is in any way curious or important. It will be found that at some time or other, especially during a relapse, the colour-index in every case of pernicious anæmia will be greater than 1, and in the remissions, during which rapid improvement occurs, may quite well fall to the low figures recorded. This opinion is strongly supported by experimental work on animals. The information contained in the paper concerning the results of gastric analysis has particular interest in connexion with the views recently put forward by A. F. HURST. Examination of the gastric contents was carried out in 25 cases of the series; in 24 of them free HCl was absent from the gastric juice.

[2] Über die perniciöse Anämie der Pferde, Ziegler's Beiträge z. allg. Path. u. path. Anat., 1914, lviii., 285.

These cases included four investigated during a remission of symptoms, when the hæmoglobin was 70 to 82 per cent. All of these also showed complete achlorhydria. The whole question of whether achlorhydria is a primary or secondary manifestation of the disease must remain sub judice until further work has been done. In only 14 of the 75 cases were lesions of the mouth and tongue present in a degree sufficient to be noted in the clinical reports. CAMPBELL and CONYBEARE rightly attract attention to conditions commonly found in the clinical investigation of the disease, which may be due to long-continued treatment with arsenic. These conditions include such diverse symptoms and signs as pigmentation of the skin, diarrhœa, and peripheral neuritis. With regard to treatment, the usefulness of blood transfusion in tiding over the most intense stage of anæmia is emphasised, although the possibility of cure by such treatment is not urged. The writers quote the late Sir WILLIAM OSLER'S five essentials in the treatment of pernicious anæmia—a correct diagnosis, rest in bed, fresh air, good food, and arsenic. They suggest the addition of the three following methods: blood transfusion in suitable cases at the correct stage, vigorous treatment of focal sepsis wherever it is found, and —on HURST'S theory—the administration of hydrochloric acid by the mouth.

The Bacteriology of Canned Meat and Fish.

THE appearance of a Report[1] on this subject is opportune in view of the great interest now being taken in the subject of food poisoning, and its relation to canned and other forms of preserved foods. It represents the first comprehensive study which has been made in this country of the bacteriology of these classes of foods, both when sound and when found to be unfit for consumption. It deals with a very detailed examination of 323 tins of canned foods, 246 of which were rejected as defective, while 77 were ordinary sound shop samples. In addition a large number of tins were used for special inoculations with pure bacterial cultures and for other experimental work. The report is a detailed one, and should be studied by all immediately concerned, as will be seen by the following enumeration of its more significant findings.

The most striking fact in the Report is the comparative non-sterility of tins externally sound with perfectly good contents. Less than 30 per cent. of these tins when examined were sterile, and the percentage not sterile ranged from 36 for sardines to 100 for crab. Of canned meat 63·6 per cent. of the tins were not sterile. While many of the types found belonged to groups which the authors show elsewhere in the Report to be incapable of developing decomposition changes, this was by no means always the case, for bacilli, aerobic and anaerobic, were isolated which differed in no way from strains which were shown to be the cause of decomposition in unsound tins. The Report gives the death-blow to the generally accepted conclusion—accepted even in scientific circles—that canned foods remain good because the processes of preservation by heat have sterilised them. Whether the food remains good depends not only on the numbers of living bacteria introduced and their kinds, as well as upon the efficiency of the heating given, but, and to an important extent, upon the physical conditions within the tin. Of these conditions by far the most important is air access, which acts not mainly because it may introduce bacteria from outside, but because it supplies oxygen to bacteria already viable but dormant in the food. "To remain sound a tin must be and remain air-tight." Of particular interest is Section III. of the Report, which is an account of special investigations upon the relationship between oxygen requirements and decomposition changes. The authors took 17 tins of salmon, herrings, lobster, and other marine substances, purchased in the open market and apparently perfectly sound, and incubated them with air access, so arranged that the entering air was free from bacteria, for periods up to 16 days. Of these 17 tins no less than 12, or 70 per cent., became definitely unfit for food, and if the tins were sealed up again after an interval, "blown." From the tins anaerobic or aerobic bacilli were readily isolated, identical with those shown to be the cause of spoilage. Controls of the same brand, incubated without air access remained good and appeared sterile when bacteriologically examined. These results were confirmed by another series of experiments conducted on rather different lines. Dr. SAVAGE and his associate workers advance the view that these organisms are present as spores in the majority of marine food products, but are unable to develop until conditions are suitable. Given air access simpler products are elaborated, and then they can develop, multiply, and decompose the food. An extended study of the types of bacteria found in these foods, sound and unsound, was made, the authors grouping them under moulds and yeasts, obligate anaerobic bacilli, sporing aerobic bacilli, thermophilic bacilli, non-sporing aerobic bacilli, and micrococci. Each group is critically considered as a cause of unsoundness. They show that much depends upon the presence of proteolytic properties, the ability to produce gas from carbohydrate and allied substances, and upon the requirements of the organism as regards oxygen. It is further brought out that the kind of food influences the type of organism associated with spoilage. For example, although yeasts are the common cause of spoilage in milk they are unimportant in meat and fish, anaerobes are very important as regards meat, while non-sporing aerobes of the types of *B. coli* and *B. cloacæ* are of significance for marine products.

As an illustration of the methods and of the thoroughness of the investigations made, the group of sporing aerobic bacilli may be selected. The authors show in detail that not only are these bacilli found equally in all their three groups of tins—the sound shop tins, samples rejected but with good contents, unfit samples—but that the types which possess proteolytic properties, and which therefore are potentially capable of causing decompostion, are just as widely and evenly distributed. They show that when these strains are introduced in pure culture into tins and at once sealed up, decomposition does not occur unless the tin has an undetected leak. Following this up they demonstrate that when sterile air access is permitted decomposition follows the inoculation of a tin with a pure culture. They make the further observation which they regard as new, that a considerable proportion of these canned food strains grow readily under ordinary anaerobic conditions and definitely, but with difficulty, under the severest anaerobic conditions they could devise. Such an observation suggests a dilemma, since it leaves them to explain why living organisms, which are proteolytic and can grow without any oxygen, do not in fact develop and ruin the contents of the tin. By a further series of experiments they demonstrated that while these strains can grow under anaerobic conditions,

[1] Special Report No. 11, issued by the Food Investigation Board. By William G. Savage, M.D., B.Sc., R. F. Hunwicke, B.Sc., A.I.C., and R. B. Calder, B.Sc. H.M. Stationery Office. 2*s*. 6*d*.

they then do not produce sufficient enzymes to supply them with the simple products necessary for their growth. These experiments confirm the others mentioned above as to the primary necessity of a supply of oxygen if decomposition is to take place. It will be appreciated that these experiments and the results of the systematic examinations of unsound tins have an important practical bearing upon canning problems. They illustrate how very complex are the processes at work, and how far removed is the whole subject from the simple views which are generally accepted. The Report, it will be gathered, is mainly concerned with spoilage conditions, and does not discuss the relationship of canned foods to outbreaks of food poisoning; but it is perhaps worth mentioning that none of the recognised food-poisoning organisms —salmonella strains or *B. botulinus*—were present although looked for in every tin.

OVERCROWDING AND TUBERCULOSIS.

Dr. Andrew Trimble, chief tuberculosis officer of Belfast, has just issued a comprehensive and well-arranged annual report for the year ending March 31st, 1922, which shows a definite decline in death-rate from the disease. The number of new patients examined during the year was 1703, as compared with 2121 in 1921 and 2529 in 1920. Of these 1014 were found to be tuberculous and 703 non-tuberculous, while 173 were "suspect." These figures include 207 transfers from patients formerly only suspect to the groups of the tuberculous or non-tuberculous. As regards the forms of tuberculosis, there were 340 males and 422 females in the pulmonary group, 41 males and 79 females in the glandular group, 34 males and 46 females in the osseous group, 18 males and 15 females in the abdominal group, and 10 males and 9 females in the remaining groups. These figures show a slight falling off in pulmonary tuberculosis, which was only 75 per cent. of the total, as compared with 78 per cent. and 82 per cent. in the two preceding years. In addition to examination of new patients there were 22,319 re-attendances of old patients at the various institutes, as compared with 21,436 in the previous year. As regards the forms of treatment, 1413 patients received treatment at the dispensary, 3493 received domiciliary treatment, and 344 received institutional treatment. Dr. Trimble emphasises the importance of a frequent review of cases receiving domiciliary treatment.

The report deals at length with the evidence available on the subject of infection. The general conclusion is that 41 per cent. admitted personal association with tuberculosis amongst other members of their families. In many cases the report states that "whole families have been wiped out by the disease." Figures are given showing the large proportion of tuberculous patients sleeping in the same bedroom with other persons, and even in the same bed. No less than 437 patients slept with one other person, 240 with two others, 53 with three others, and 8 with four others. The home conditions of patients were classified as follows: exceptionally good 4, very good 28, good 138, average 627, bad 143, very bad 41, exceptionally bad 8. The proportion of cases from the different wards in the city show a ratio ranging from 5·9 per 1000 in Smithfield Ward and 4·4 in Falls Ward to 1·6 in Windsor Ward and 1·5 in Duncairn Ward.

Dr. Trimble adds that the open-air school at Graymount continues in successful operation. The school is intended for children living in contact with persons suffering from tuberculosis, who should be separated from infection and have their education provided as well as good nourishment. There is at Graymount also a hospital for osseous and non-pulmonary forms of tuberculosis, with 50 beds, of which 47 are now occupied, but the tuberculosis officer reports that at least 200 beds should be provided and that after-treatment should be pursued at the seaside.

Annotations.

"Ne quid nimis."

MULTIPLE PERIPHERAL NEURITIS.

THE presidential address delivered before the Section of Neurology of the Royal Society of Medicine by Dr. Wilfred Harris, and published in the present issue of THE LANCET, is devoted to a consideration of the less common varieties of polyneuritis. Familiarity with the somewhat hackneyed forms produced by the absorption of alcohol, say, or of lead, only serves to accentuate the large lacunæ in our ætiological and therapeutic knowledge in respect of the rarer types, some of which, for that matter, are not particularly rare. Where motor and sensory symptoms dominate the clinical picture the case is likely to come under the care of a neurologist, or at least a neurological opinion will probably be called for; yet Dr. Harris indicates clearly in his valuable address how frequently a neuritic or polyneuritic syndrome supervenes in the course of diseases—malignant, febrile, infective, hæmic—with which the general physician is more immediately concerned, and gives one or two illustrations of the affection as it occurs in cases that belong to the groups of industrial and of tropical disease. Nor is the catalogue to be regarded as closed. We do not know that industrial development will not bring in its train additional examples of toxic affection of the peripheral nerves; nor should we be surprised if with advances in the study of tropical disease new varieties of polyneuritis are recognised and described. The subject, in short, is one which calls for intensive research by experts of different specialties working in collaboration. Herein lies the special importance of Dr. Harris's comprehensive study.

Adopting a fourfold ætiological classification, Dr. Harris divides polyneuritis into varieties produced by the action of external poisons, of autotoxins, of infective and of cachectic states respectively, and the factors are indeed sufficiently numerous when set down in a list. Even so, cases are met with in practice that do not seem to be accounted for by any of these known agents, while in other instances the action of the presumed toxin or poison is problematical or obscure. Thus Sir William Gowers used to speak of the case of a seamstress whose clinical condition was one apparently of arsenical neuritis and who, it was supposed, had gradually absorbed the poison by drawing coloured silk threads through her teeth as she wetted their ends for the needle. Improbable as this may perhaps appear, still more obscure examples of toxic absorption might be cited. We must candidly admit our frequent ætiological ignorance even in obvious clinical instances of the disease. To Dr. Harris we are indebted for directing attention to the remarkable group of hæmatoporphyrinuric neuritis, especially to its occurrence where the action of sulphonal and similar drugs can be definitely excluded. Passing allusion is made in the address to cases in which there is evidence of both peripheral and central involvement. The term "central neuritis" was originally coined by Adolf Meyer for the pathological condition underlying some forms of presenile psychosis —in particular, involutional melancholia—in which were found changes in the myelinated fibres of the cerebrum analogous to those in the peripheral nerves in peripheral neuritis. It might with advantage be used in cases where central accompanies peripheral disturbance, as in the psychosis of alcoholic polyneuritis—the so-called Korsakow syndrome. More recently, the same expression has been employed by Dr. H. H. Scott[1] to characterise a peculiarly interesting disease which has been occurring in Jamaica both in chronic and in epidemic form, and which has usually been known as Jamaican peripheral neuritis. From a painstaking clinical and pathological study, Dr.

[1] Annals of Trop. Med. and Parasitology, vol. xii., October, 1918.

Scott has come to the conclusion that the disease can be distinguished both from beri-beri and from pellagra. It is noteworthy pathologically for changes both in peripheral nerves and neuraxis resembling those of ordinary peripheral neuritis, and Dr. Scott admits that in this respect the morbid anatomy is not unlike that of pellagra, though there is no evidence that it belongs to the class of deficiency disorders. Further, the impressive clinical fact seems to be definitely established, that only those patients develop the disease whose intestinal condition, as the affection begins, is one of constipation; if a profuse diarrhœa appears, as in not a few cases, the nervous symptoms fail to become prominent, or, indeed, to manifest themselves at all. Here, then, we seem to have a variety of toxic neuritis, quite possibly of alimentary origin, in which central and peripheral nervous systems alike are implicated, and which offers suggestive pathological analogies with pellagra, and also with the peculiar affection known to the neurologist as subacute combined degeneration of the spinal cord, or funicular myelitis.

It is obvious, we think, that by a correlation in this fashion of morbid entities, examples of which are likely to be met with by workers in many separate branches of medicine, light will be thrown on some of the obscure cases narrated by Dr. Harris. The whole subject stands in need of further elucidation; too commonly is a case diagnosed as polyneuritis of unknown origin. By his timely address Dr. Harris has awakened us from a tacit acquiescence with what in reality constitutes a state of ignorance. Renewed attention will now be directed to a class of disease in which research is sure of abundant reward.

THE TREATMENT OF TUBERCULOSIS OF THE LARYNX.

IN gauging the value of any treatment it is, of course, essential that the frequency of spontaneous arrest or cure of the disease under consideration should first be ascertained. This obvious precaution is apt to be neglected by enthusiasts; were it always taken, many a therapeutic novelty would come to an untimely end. Tuberculosis of the larynx illustrates this point, for there are few diseases which have been more mercilessly tinkered at and tampered with, to the discomfort of the patient. The era of local treatment has, however, almost passed, and it is now universally admitted that tuberculosis of the larynx is a comparatively benign disease which is nearly always automatically arrested when the original pulmonary disease becomes quiescent. In this connexion two important papers have recently been published. The first is by Dr. O. Strandberg,[1] of the Finsen Institute in Copenhagen. He has treated 61 cases of tuberculosis of the larynx by complete arc-lamp baths, the naked patients being accommodated in a room in which one or more arc-lamps are burning. Although most of his patients resided in their homes, coming to the Institute from time to time for a light-bath, in many cases returning to work in the intervals, 50 per cent. were discharged as cured. Considering that all these 31 cases were complicated by pulmonary tuberculosis this result seems at first sight remarkably good. So it is, perhaps, and of the importance of the studies in actinotherapy conducted at the Finsen Institute there can be no doubt. Scientific actinotherapy in tuberculosis is in its infancy, and it is to be hoped that it will prove of far-reaching value. But the more valuable it is, the better can it stand searching criticism, and it would be well to bracket with Dr. Strandberg's paper another by Dr. I. D. Bronfin and Dr. C. Markel.[2] Their study of 200 cases of pulmonary tuberculosis showed that in as great a proportion as 85 per cent. there were pathological changes in the larynx which, in at least 63 per cent., were tuberculous. It was found that among 139 cases, undergoing little or no treatment, there were only eight showing progress of the disease, whereas 31 showed improvement, and 100 were stationary. It is not, therefore, surprising to find the authors of this paper coming to the conclusion that, though subacute or chronic tuberculous laryngitis should be under constant observation, it does not require active treatment in the absence of distressing symptoms. They consider acute or peracute laryngeal tuberculosis to be rare, and their findings are confirmatory of other recent writers who are inclined to class tuberculosis of the larynx with tuberculosis of the bladder, both being comparatively benign conditions which clear up when the primary focus of disease can be arrested or eliminated.

[1] Deut. med. Woch., July 14th, 1922.
[2] American Review of Tuberculosis, July, 1922.

NEW VIEWS ON THE THYMUS GLAND.

RECENT knowledge acquired regarding the thymus gland seems to be but slightly spread, and clinical literature is full of expositions that appear to start from obsolete views as to the structure and function of this gland. J. A. Hammar claims that our knowledge of the thymus is more thorough than that of the majority of the organs closely related to it functionally, and in the Upsala *Läkareförenings Förhandlingar* for August, 1922, he sets forth new views as to the morphology of the thymus and their bearing on its function.

The thymus, we may recall, is an epithelial organ issuing from the third branchial pocket, and in the majority of cases is entodermal in origin. It early becomes infiltrated with lymphocytes—in man as early as towards the end of the second month of pre-natal life, at an embryonal length of about 30 mm., the formation of the medulla begins at about a length of 40 mm., and the first corpuscles of Hassall appear towards the end of the third month at about a length of 50 mm. By mitotic division, both of lymphocytes and the reticulum cells, and the ingrowth of connective tissue, the organ becomes lobulated and grows rapidly during pre-natal life. An analysis of 80 normal thymus glands made by Dr. Hammar shows that the number of Hassall's corpuscles quickly increases. They start as small formations of one or more reticulum cells, 10–25μ in diameter, increase in size, and assume a spherical shape. The majority, even in pre-natal life, do not normally attain a greater diameter than 25–50μ. Some, however, post-fœtally may reach 500μ. The author insists that the thymus is not a transitory organ, but persists and functions even in old age. At puberty, however, its parenchyma begins to be reduced—"age involution." The turning point in the existence of the organ is at the age of puberty (11–15 years). Up to this time, not only does its size increase, but the parenchyma remains undiminished in volume. After this time there is a rapid reduction in the bulk of parenchyma in the organ, while the interstitial tissue usually assumes the character of adipose tissue and forms the greater part of the organ. The typical structure, however, is retained in principle; the division into cortex and medulla, mitosis of leucocytes and reticular cells, and Hassallian corpuscles remain quite up to old age, so that, notwithstanding age involution, a functioning parenchyma remains, as a rule, even in old age, and the organ itself is a factor to be reckoned with throughout life, not only during childhood. In various animals, also, involution due to age begins at sexual maturity. That the sexual glands play a decisive part in the age involution is best shown by the condition of the organ after castration. Pre-pubertal castration does not affect the thymus before puberty, when it allows the amount of the parenchyma in the organ to remain at a higher level than the normal.

Age involution shows itself first in the cortex, and later on the medulla undergoes a reduction. With age involution, the decrease in the number of lymphocytes is the chief cause in the diminution of the volume of the cortex. The thymus is, however, never found in normal condition in subjects who have

died from disease; generally the parenchyma is greatly reduced ("accidental involution"), quite exceptionally it is increased. In animals, and in man, the thymus is exceedingly sensitive to the influence of inanition, the cortex being the part most affected, mainly due to emigration of lymphocytes from it. Everything points to an extensive mobilisation and considerable export of lymphocytes, while the number of mitoses decreases to a very great extent. Involution of a different type is produced by X rays, and another form of involution occurs in pregnancy. Hyperplasia is relatively rare; it has been found after castration, in Graves's disease, Addison's disease, myasthenia, acromegaly, and so-called thymus death. The best-known hyperplasia is that in Graves's disease, and in typical cases the corpuscles of Hassall are increased to an extent beyond all doubt. There is a clear distinction to be drawn between thymus asthma, resulting in death, which is due to the effect of pressure on the air-passages and so-called "thymus death," occurring quite suddenly and unexpectedly, in an apoplectiform manner. The latter are cases of death from heart failure. There are no morphological observations that could justify the idea that the thymus carries out any secretory activity. Dr. Hammar puts forward the view that the lymphocytes in the thymus are necessary postulates for the function of the organ, but that the essential functional changes take place in the epithelial thymus reticulum in the form of an enlargement of separate cells or cell-groups, causing in mammals the formation of the concentric cell complexes known as Hassall's corpuscles. These originate under the influence, direct or indirect, of the lymphocytes of the medullary reticulum, which is prepared and "sensibilised" by special influences (thyroid ?), and they form the morphological expression of an antitoxic activity.

DEAFNESS IN SCHOOL-CHILDREN.

IT may not be wise to leave the detection of deafness in school-children to their teachers, however conscientious. This is the lesson taught by Dr. F. Leegaard,[1] who was appointed in 1919 by the school authorities in Christiania to examine the ears of children attending the public elementary schools. Among 4721 children in the third school year he found 459, or 9·7 per cent., suffering from some degree of deafness, which in 119 cases was bilateral. In more than half the number of unilateral and bilateral cases the teachers proved to have been unaware of this disability, and the children therefore ran the grave risk of being transferred to special institutions for the mentally deficient, whereas their imperfect hearing qualified them for the special educational facilities provided for the deaf. It was found that chronic suppurative otitis was present in 1·4 per cent. of the 9442 ears examined, and in 2·5 per cent. of the 4721 children. Chronic otitis was found in 22·1 per cent. of the 578 deaf ears and in 25·3 per cent. of the 459 deaf children, and in most of these cases of chronic otitis hearing was more than a little reduced. In 1·7 per cent. of the 9442 ears dry perforation of the tympanum was found, and was associated with some degree of deafness in 1 per cent. Among the 578 deaf ears the incidence of defects of the tympanum was as high as 17 per cent. In most of these cases, however, the deafness was only slight or moderate. Scars of the tympanum were found in 1·7 per cent. of the 9442 ears, and in 0·31 per cent. they were associated with some degree of deafness. These defects were found in 5 per cent. of the 578 more or less deaf ears. Tubal catarrh was demonstrable in 24·7 per cent. of the 578 deaf ears, and the cause of the deafness was traced to acute otitis in 2·4 per cent. and to cerumen in 7·9 per cent. In as great a proportion as 20·8 per cent. of all the deaf ears no disease of the tympanum could be found, and no definite diagnosis could be made. One of the by-products of Dr. Leegaard's systematic examinations was the discovery that, between the ages 9 and 10, the incidence of adenoids and enlarged tonsils was remarkably high and was often unassociated with deafness or any other departure from ordinary health. It is evident that Dr. Leegaard's work has fully justified the course taken by the Christiania school authorities in appointing a specialist in diseases of the ears to the school medical service, and it is safe to predict that in more than one case this appointment will have had a far-reaching effect on the child's future.

[1] Norsk Magazin for Lægevidenskaben, 1922, lxxxiii., 225.

THE VALUE OF THE DUODENAL TUBE IN DIFFERENTIAL DIAGNOSIS.

Dr. M. Einhorn[1] reports three cases to illustrate the value of the duodenal tube as a means of differential diagnosis in gall-bladder disease. The examination must be made in the fasting condition. The first case, a woman of 50, was, after X ray and test-meal examinations, diagnosed as carcinoma of the stomach, but subsequent examination of the duodenal contents revealed cholesterin crystals, mucus, and bacteria, with complete absence of the pancreatic ferments. Exploratory laparotomy confirmed the diagnosis of cholecystitis with gall-stones. The second case, with classical symptoms of duodenal ulcer, with hunger-pains and high acidity, was diagnosed as cholecystitis, mucus and pus being found in the duodenal contents. Operation confirmed the diagnosis. The third case had been sent to hospital, diagnosed as intestinal obstruction. The bile contained multiple cholesterin crystals and was cloudy. A diagnosis of gall-stones was made. At the operation the cystic duct was found blocked by a large stone, and the gall-bladder contained blood-stained pus. Dr. Einhorn lays stress on the mistake often made of calling the dark bile that is obtained after injection of magnesium sulphate into the duodenum "gall-bladder bile." In the last case described magnesium sulphate was injected into the duodenum, and dark bile was obtained which resembled the typical "gall-bladder bile," but in this case it was proved at operation that the cystic duct was completely obstructed, and that the gall-bladder contained no bile, but only blood and pus. It is therefore clear that this characteristic bile came from the liver. In reviewing these cases it is significant that the diagnosis of gall-stones was made on the presence of numerous cholesterin crystals, and the diagnosis of cholecystitis on the presence of mucus and pus in the duodenum, with or without cholesterin. Can these findings be claimed as pathognomonic of cholecystitis with or without stone formation? Dr. Einhorn reports another case, diagnosed by his method as cholecystitis with duodenal ulcer, in which cholesterin crystals were present, but at operation only a chronic cholecystitis was found, and suggests that in such cases fine and sand-like matter is continually passed without ever developing into a stone.

[1] Deutsche medizinische Wochenschrift, July 28th, 1922.

THE RELATION BETWEEN SYPHILIS AND YAWS.

ANOTHER attack was made at a recent meeting of the American Society of Tropical Medicine upon the individuality of yaws. Lieut.-Commander J. C. Parham, whose paper appears in the current issue of the *American Journal of Tropical Medicine* (Vol. II., No. 4, July, 1922), bases his argument principally upon his own observation since the year 1900 of the absence of syphilis in the island of Samoa. Although the natives have been in contact with Caucasians since 1850 no cases of syphilis were seen during a period of two and a half years in a hospital which was the only medical recourse of a population of 7000. Routine physical examination of 3000 Samoans failed to disclose evidence of a single case of syphilis. This observation confirms others which have been made from time to time. Commander Parham, believing the fact of sufficient significance to warrant an inquiry

into the relation of the two diseases, has brought a formidable array of evidence in favour of the hypothesis that yaws is "stone-age syphilis," and that the *Treponema pertenue* is simply a strain of the *Treponema pallidum*. Charlouis's experiment of inoculating syphilis into a patient already suffering from yaws is dismissed on the ground that it was done at a time when the observer was dependent on clinical and therapeutic criteria only. On the other hand, the writer points out that there is no morphological distinction between *T. pallidum* and *T. pertenue*, and that the serum of yaws patients shows no distinction from that of syphilitics to immunological tests. The points of differential diagnosis mentioned in the text-books are for the most part bluntly denied by this observer, who quotes Manson-Bahr and Castellani in support of the variability of the skin lesions in yaws and Butler in evidence of the possibility of yaws being hereditary. Captain C. S. Butler, who supported Commander Parham in the subsequent discussion, brought out some further points, particularly the common occurrence of yaws in early years among the natives. "Under stone-age conditions of sanitation," he said, "syphilis constitutes one of the exanthemata of childhood. This early occurrence may explain the rarity of hereditary forms of yaws as well as the rarity of the venereal site for infection."

Neither the arguments nor the observations of Commander Parham in Samoa can be taken as final proof that syphilis and yaws are identical. There is evidence that gonorrhœa is also very rare in Samoa, and no reason has been advanced to explain a racial immunity to gonorrhœa. Nevertheless both observation and reasoning are suggestive, and challenge further investigation. There is, for example, distinctive histopathology of the framboesian growth[1] which needs more explanation than the one suggested by Commander Parham—namely, that the infection in framboesia is not free from secondary organisms. If the characteristic primary lesion in yaws is due to other organisms than the *T. pertenue*, what are these organisms, and why are they not found in those parts of the world where syphilis is rampant?

THE DISTRIBUTION OF KIDNEY LESIONS.

IT is a familiar fact that in the ordinary granular kidney it is uncommon, perhaps unknown, to find all the stages of glomerular sclerosis. As a rule, the glomeruli are divisible into groups, each of which shows one stage in the process of obliteration. Thus there may be a certain number of intact glomeruli, another group in which the annular overgrowth occupies perhaps one-half of the glomerular area, and a third in which the glomeruli are represented by hyaline masses. The whole series of gradations can be seen only in combined pictures from several cases. The natural inference is that the primary destructive lesion occurs in attacks at intervals, and that in each attack only a certain proportion of the glomeruli are involved. In the current number of the *Journal of Pathology and Bacteriology* Dr. V. R. Khanolkar advances an interesting hypothesis to account for this. He supposes that the "all or nothing" principle, best known in the physiology of muscle and nerve, is of general application to all organs, that in moderate activity some of the elements (in the case of the kidney, some of the glomerular units) are at any one moment fully active while the others are at rest, and that any poisonous agent circulating in the blood will attack active rather than passive elements, partly because of their more ample blood-supply, and partly because of their inherently more reactive condition. In a series of experiments on rabbits he brings forward evidence that in moderate activity the glomeruli are certainly not all equally active, which they are when the kidney is roused by the exhibition of diuretics. The general idea seems extremely suggestive, and it would be worth while to work out its implications in a variety of directions. In one way it may well throw light on the difficult question of why only parts of uniformly arranged organs are injured by some agent which reaches them by the blood-stream. In another way it may elucidate the familiar but altogether unexplained relation between excessive functional activity and pathological changes—why, for example, lead palsy is apt to fall on parts of the nervous system that are much used; why cardiac necrosis with subsequent fibrosis is more frequent in muscular men with large hearts; why complete bodily rest is the first essential in the treatment of all infections.

[1] See article on Yaws, by A. Castellani, in "A System of Syphilis," edited by D'Arcy Power and J. Keogh Murphy, 1909 edition, p. 146.

HOSPITAL EXECUTIVES.

A COMMITTEE of the Rockefeller Foundation recently reported[1] on hospital administration in the U.S.A. and Canada. This report was largely devoted to considering the supply of what are known in America as "hospital executives"—that is to say, salaried officers responsible for administration other than the medical and nursing staff, the technical assistants, the porters, and ambulance drivers. The numbers of these officers appear to be very large in the States, and the question of their recruitment and training is an important one. In this country the corresponding officers do not seem to have become, even on paper, quite such a compact body of workers. Their numbers may be roughly gathered from a statement of the actual appointments at two hospitals taken at random. At one of the largest metropolitan hospitals there are employed in the clerk's office a senior assistant, a cashier, two assistant clerks, and three women clerks; in the steward's department, this officer has a staff of four assistant clerks and three women clerks; in the appeal department there is a secretary with two collectors (one of whom is a woman) and four assistant clerks (three of whom are women). In a large provincial hospital the executive officers comprise a total of 32—namely, 18 men and 14 women; of the 18 men 5 are heads of departments, 9 are junior officers, and 4 are not classified. The list may be of sufficient interest to quote entire:—

Assistant to general superintendent (M*), orders and invoices (M J), admissions and discharges (M J), patients' maintenance payments (M J), postages, minutes, &c. (M J), clerk to collector (M J), office boy (M J), cashier (M), assistant to cashier (M), records—semi-pensioner (M), senior typist (F), assistant typist (F), assistant typist appeals (F), surgical tuberculosis and pensioners (F), medical board, dean and "follow up" (F), electro-cardiological (M J), X rays (F), out-patients (M), assistant out-patients 3 (F), steward (M), assistant steward (M), assistant to steward (M J), clerk to steward (M J), venereal diseases (F), assistant venereal diseases (F), collector (M), assistant collector (M), canvasser (M), canvasser (F), clerk to clerk of works (F).

* M = male, F = female, J = junior officer.

Doubtless other hospitals have a similar personnel.

As we learn from a recent issue of the *Hospital Gazette*, consideration of the question of State control has been forced upon these officers. In some respects such control would appear to offer advantages to junior officers in the way of short and regular working hours, adequate payment, guarantee of holiday, rise of salary by well-defined gradations, a superannuation scheme—in fact, such an assured and placid existence as is supposed by some to characterise the life of the civil servant. State control would, it is assumed, entail a competitive entrance, possibly of matriculation standard, along with a strict medical examination. As it is taken for granted that, under State control, the chief administrative officer of the hospital would be the medical superintendent, it is inferred that there would then be little scope for personal ambition, and the human factor might enter less into the question of hospital service than it does at present. These are the pros and

[1] THE LANCET, August 19th, p. 402.

cons as set out in the official journal of the Incorporated Society of Hospital Officers.

The least of the junior officers in a hospital is the office boy, who is in some cases recruited from the staff of messenger boys, and of whom one, at least, has risen to the position of secretary at a provincial hospital. Many junior hospital officers will never advance far on account of lack of initiative, education, or ambition; some may be influenced unduly by the suggestion of overtime and the alleged benefit of trade-union membership. Although the junior officer is not the 30*s.* a week clerk which he was before the war, he still tends to remain junior officer. In regard to the higher posts, undoubtedly the successful administrative officers of hospitals are those who have passed the acid test of public school and university training. The Rockefeller scheme of training, however, hardly seems to meet the need in this country. The suggested nine months' course followed by four months of practical work in hospital and two months spent in visiting other hospitals would certainly be useful preparation, but the aspirant for executive distinction would still have to be prepared to start at the bottom of the ladder. Administration of a large hospital may involve keeping the peace between conflicting factions, disciplining the unruly, exercising tact and discretion, and generally bringing a mature mind to bear upon decisions. Nevertheless there will be practical agreement that the general hospital does provide facilities for educating additional personnel of which more use might be made at the present time.

THE FAILURE OF VACCINATION WITH LIVE TUBERCLE BACILLI.

WHEN a physician, who for years has advocated a remedy, recants his praise of it, it is fairly safe to draw two conclusions. The first is that he must be an almost incredibly honest man. The second is that his recantation is justified by events; we do not repudiate our offspring unless and until they have proved quite unworthy of us. More than two years ago Prof. H. Selter,[1] of Königsberg, was so hopeful of the benefits accruing to the subcutaneous injection of live, but attenuated, cultures of tubercle bacilli, and so convinced of their harmlessness, that he injected 2 mg. of such a culture into his own thigh. Hyperpyrexia followed, and a swelling of the size of a fist turned into a cold abscess which was evacuated three weeks later. No tubercle bacilli could be found in the fluid pus, and there was no swelling of the neighbouring lymphatic glands. Since then he has prepared for subcutaneous injection a solution which he called "vital tuberculin," and which contained attenuated living tubercle bacilli as well as the protoplasm of crushed tubercle bacilli. The question he asked himself was: Will this preparation have other or better effects than those of old tuberculin? If not, there is no reason for preferring it to the old tuberculin of guaranteed sterility. He distributed his "vital tuberculin" among 52 physicians, 25 of whom tested it on 352 patients, to whom altogether 3686 injections were given. Inquiries were addressed to them concerning any ill-effects the live cultures might have had on the patients, and a request was made for a comparison between the effects of "vital tuberculin" and old tuberculin. It transpired that abscess formation had followed 44 injections, but in no case had tubercle bacilli been microscopically demonstrable in the pus. The subcutaneous inoculation of a guinea-pig with the pus of one of these cases did not generate tuberculosis in it. These abscesses did not, apparently, exercise any ill-effects on the tuberculosis from which the patients were already suffering, and one physician, who had given more than 900 injections, had found them to be well tolerated. But—and this is the point Prof. Selter emphasises with all the force that italics can convey—the conclusion to be drawn from his colleagues' tests is that the action of live tubercle bacilli depends solely on their tuberculin content; live tubercle bacilli injected subcutaneously in small quantities into an organism already infected with tuberculosis exercise no other function. They cannot, he argues, increase the immunity already present in the body, and they act simply as specific stimulants in the same way as the various tuberculins. So, though this procedure is practically harmless to the already infected organism, it is no advance on treatment by the injection of sterile tuberculin. Though it can hardly be expected that this paper will discourage Friedmann and his followers, it will be read with interest by the many who have tried to keep an open mind on this subject.

[1] Deut. med. Woch., Sept. 8th, 1922.

VACCINIA OF THE EYELIDS.

ACCORDING to Dr. J. M. Ball and Dr. N. Toomey,[1] of St. Louis, who report a case in a girl aged 5 years, about 80 cases of vaccinia of the eyelids have been recorded in the literature. Only 25 per cent., however, of these cases were due to vaccinated persons inoculating their own eyes, as in the writers' case, the remainder being due to vaccinators, mothers, nurses, and others infecting their eyes from the vaccination vesicles of someone under their care. In addition to these cases there have been eight in which the cornea was accidentally the primary seat of inoculation. In the 80 cases of palpebral vaccinia the cornea was involved by extension in about 10 per cent. The class of cases caused by hetero-inoculation—i.e., inoculation of vaccine matter from the arm or leg of one person on the eye of another—occurs 20 times oftener in adults than in children, 90 per cent. being in women on account of vaccinated children being mostly under their care. On the other hand, cases of homo-inoculation occur almost without exception in young children. The clinical appearances of palpebral vaccinia are not quite the same as those of vaccinia on a dry skin surface. Owing to the macerating effect of continuous lacrymation the vaccine lesion soon loses its vesiculated epidermis and acquires a more yellowish or creamy tinge even before the epidermis is detached than when the lesion is on other skin surfaces. After detachment of the epidermis the base does not become covered with thick tenacious crusts, but has something of a diphtheritic appearance. As lacrymation subsides the ulcerated base becomes covered with a thin, glazed, reddish-brown crust. In view of the degree of scarring caused by primary vaccinia of the skin, the prognosis of secondary vaccinia of the eyelids is usually surprisingly good. Severe complications, however, may arise when the conjunctiva or cornea is involved by secondary extension. The loss of the eye has then been observed, and corneal opacities that interfered markedly with vision have been described. The palpebral deformity may consist only of a small pale area of thin soft scar with a loss of some cilia, as in the writers' case, or it may amount to marked adhesions binding one or both lids down to the globe.

THE MECHANISM OF EMPTYING THE STOMACH.

THE accepted explanation of the mechanism by which the food is passed periodically out of the stomach into the duodenum is based on the relative condition of acidity of the food, first on the gastric and then on the duodenal side of the pyloric sphincter. The acidity of the food on the gastric side is believed to cause a reflex opening of the pylorus, and the acidity of the food on the duodenal side causes its closure. Hence, until the acid food which arrives in the duodenum becomes neutralised by the duodenal juices, no further opening of the sphincter can take place. Dr. E. Egan,[2] of Szeged, states that as a result of numerous examinations by means of the barium meal on persons with all degrees of acidity of the gastric contents, he is led to the conclusion that the

[1] Journal of the American Medical Association, Sept. 16th.
[2] Medizinische Klinik, Sept. 3rd, 1922.

mechanism of the opening and closing of the pylorus is independent of the acidity of the contents. He quotes the results of experiments by Hirsch, v. Mering, and Pavlov as leading to our present-day conception that the closure of the pylorus is due to acidity on the duodenal side, but he does not mention the possibility that it may need acid on the gastric side to cause it to open. Presumably, from his interpretation of the experiments quoted above, the pylorus is in a state of relaxation until the food in the duodenum causes it to contract. According to this theory, anacidity should cause the pylorus to remain permanently relaxed, so that neutral or alkaline food would pass rapidly through without hindrance. If, however, the theory be accepted that the pylorus is normally closed, and the presence of acid food on the gastric side is necessary to make it open, then anacidity should lead to permanent closure of the pylorus, and consequent stagnation of the food in the stomach. In practice, however, neither of these theories can be held to be correct. Dr. Egan demonstrates by X ray examination that the acidity of the gastric contents plays little if any part in the movements of the pyloric sphincter, and that in persons with diminished or absent acidity, the pylorus acts in a manner exactly comparable to that of a person with a normal acidity, that in a few cases the stomach empties more rapidly, and in still fewer more slowly. The well-known clinical fact that cases of duodenal ulcer have a high acidity, accompanied by rapid emptying of the stomach, would be in favour of the acid action on the gastric side of the pylorus, but Dr. Egan has shown that an artificial meal of a high acidity (proved by the fractional test method) produces no such rapid emptying of the stomach, and further that the continuous neutralisation of the stomach contents during digestion has no influence on its emptying time. He therefore finds it impossible to accept the hitherto recognised theories as correct, but suggests no alternative explanation.

PITUITARY EXTRACTS IN PREGNANCY AND LABOUR.

IN the course of two post-graduate lectures delivered last session and published in *St. Bartholomew's Hospital Journal* for August, Dr. Herbert Williamson gives some valuable hints as to the use and abuse of extracts of the posterior lobe of the pituitary gland at or before labour. If, late in pregnancy, the uterus tends to remain flaccid under the hand, primary uterine inertia is suggested. Calcium lactate, together with 3 or 4 minims of 2·5 per cent. solution of pituitary, may be given should this condition be feared. In cases of protracted pregnancy, however, Dr. Williamson does not advise the administration of pituitary extract. His practice is to give an ounce of castor oil, and to order, as soon as the castor oil has acted, three doses of 10 gr. of quinine (30 gr. in all) to be given at intervals of two hours. Some obstetricians advise that this should be combined with intramuscular injections of ℥ iv. of a 10 per cent. solution of pituitary extract, repeated if necessary at intervals of an hour for four or five doses. But he believes the castor oil and quinine to be quite as effective without the pituitary, and the pituitary alone to be of little value. The use of pituitary after inducing labour with bougies or a bag is forbidden, since rupture of the uterus may result. When pituitary extract is used during labour it should be used in small doses—never stronger than 1 c.cm. of a 10 per cent. solution. Dr. Williamson regards 1 c.cm. of a 20 per cent. solution as a dangerous dose. In the first stage of labour, save in one or two very exceptional cases, it should not be used. If the drug is given with the cervix three-quarters dilated, the child may be born after three or four severe pains, but it will tear through the cervix, not stretch it open. In certain cases of accidental hæmorrhage and in placenta prævia pituitary extract is useful, but not in cases of concealed accidental hæmorrhage with albuminuria. This is essentially a toxæmia with necrosis of uterine muscle, and a rupture of the uterus might occur. In the second stage there must be four indications before the drug is exhibited: (1) The head must be low in the pelvis; (2) there must be no obstruction at the vulval orifice; (3) the patient must be a multipara; (4) forceps must be ready boiled. One c.cm. of 10 per cent. solution should be the maximum dose. After 15 minutes, if the baby is not born, delivery by forceps should be undertaken, and even before if there are variations in the fœtal heart-rate. Eclampsia with a high blood pressure is apparently not a contra-indication of pituitary. Dr. Ernest Holt has investigated the question whether pituitary affects the child. There is apparently more danger of asphyxia livida or pallida after pituitary has been given and the proportion of stillbirths is larger after its use. At autopsies on fatal cases there are often meningeal and cerebral hæmorrhages. Therefore in the second stage the drug must be used with discretion. On the other hand, in the third stage of labour, after delivery of the placenta, and especially with post-partum hæmorrhage, the effects of pituitary extract are excellent. It acts quicker if injected into the uterus direct, and after-pains are often relieved thereby.

BRITISH RED CROSS SOCIETY AND THE SPAHLINGER TREATMENT.

WE have received the following statement from Sir Arthur Stanley, chairman of the Executive Committee of the British Red Cross Society:—

Money to enable a cure for tuberculosis to be thoroughly tested under scientific supervision is to be provided by the British Red Cross Society.

This step has been taken after preliminary investigation which, it is considered, has established a prima facie case for the claims of the inventor.

Mr. Henri Spahlinger, of Geneva, is the discoverer of the new treatment. It consists in the use of a serum and a vaccine, the exact nature of which is known only to Mr. Spahlinger.

The statement that the Society has purchased Mr. Spahlinger's treatment for £30,000 is incorrect. Such an idea, if widespread, may excite false hopes among consumptives, which we are anxious to avoid.

At the same time, the Society is satisfied, after investigation by its expert advisers, that a case for further and thorough inquiry has been made out by Mr. Spahlinger.

Accordingly, the Society has put aside a sum of money to enable Mr. Spahlinger, who is hampered by lack of funds, to produce his remedies to a larger extent, so that they may be tried in this country.

This will be done under scientific supervision. When the material is available it will be supplied to carefully selected institutions. I may say, however, that none of Mr. Spahlinger's remedies are likely to be available before next spring.

The interest of the Red Cross in the matter arises from the fact that over 40,000 men were discharged from the army suffering from tuberculosis, and the Society wish, if Mr. Spahlinger's remedies are satisfactory, to be able to obtain these for the benefit of ex-Service men.

Sir W. Leslie Mackenzie has been nominated by the Privy Council as a member of the General Medical Council for a period of five years from Oct. 28th, 1922, taking the place of Dr. J. C. McVail, retired.

THE social evenings at the Royal Society of Medicine are to be resumed during the coming session. At the first of these functions, to be held on Wednesday, Nov. 8th, Sir William and Lady Hale-White will receive at 8.30 P.M., and at 9 P.M. Sir John Bland-Sutton will deliver an address entitled "Spolia Nemoralia: Shrunken Human Heads, Labrets and Ear-plugs." Objects of interest will be exhibited in the library.

NATIONAL COUNCIL FOR COMBATING VENEREAL DISEASES.—An extraordinary general meeting of the Council will be held on Wednesday, Nov. 1st, at 3.15 P.M., in the Barnes Hall, 1, Wimpole-street, London, W. 1. The chair will be taken by Sir Malcolm Morris, Vice-President.

THE SULPHUR SPRINGS OF THE PYRENEES.

(*Concluded from p. 827.*)

THE WESTERN PYRENEES.

THE Oriental Pyrenees have a warmer and drier climate than the more familiar middle districts of the chain, while at the western end the mountains are lower and rain is more frequent. In the very centre and below the loftiest mountains of the triple system lies Luchon, the most widely-known *station* in the Pyrenees.

Bagnères de Luchon.

Luchon is situated 2000 feet above the level of the sea in an extension of the valley of the Pique, and beneath mountains attaining to 10,000 and 12,000 feet. It is a considerable town, in contradistinction to its fellow spas, but its size is concealed by its abundant greenery.

The mineral springs of Luchon are numerous, and their constitution is varied, so that we are not surprised to find that claims to all-round excellence are put forward here in terms similar to those already quoted about Ax. Landouzy has styled Luchon "La capitale de l'empire du soufre," and another well-known hydrologist, Filhol, has said that the station "présente la série d'eaux sulfurées la plus belle et la plus complète qui soit connue." Some 60 springs, differing in temperature and chemical content, offer to the physician a large choice of agent. In temperature the waters range from 50° to 120° F., and the hottest spring, the Bayer, is one of the richest hot sulphur springs in France, while other of the springs contain almost no sulphur—for example, Le Ravi is considered to rely for its utility in urinary disease upon the presence of silicate of sodium. All the alkaline sulphur waters of the spa are brought to one central *établissement*, a large classical building, excellently appointed, and housing, in addition to the usual appliances, a good gymnasium and a reference library of balneology. The massing together of the material for the different treatments under one roof is said to be much appreciated by the patients, and undoubtedly it has its

FIG. 5.

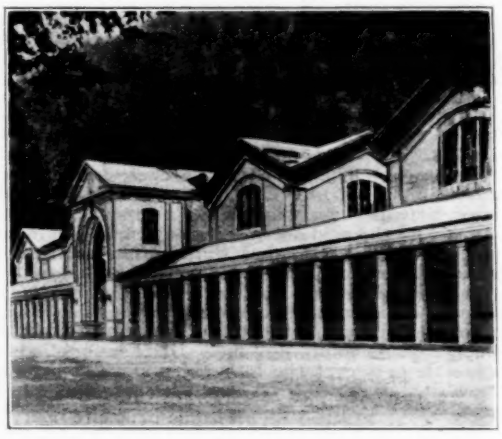
The main gallery of the Établissement, Luchon.

conveniences both for them and their advisers; but the walk for a treatment is regarded by a good many balneologists as a useful piece of discipline.

Analysis of the waters shows them, in different proportions, to contain, like the other Pyrenean springs, sulphide of sodium and sulphuretted hydrogen. As at Ax, certain of the springs on exposure turn opalescent or milky (*blanchement*), and particular efficacy in the treatment of irritable cutaneous conditions is attributed to these waters, a point which might well be tested wherever the phenomenon, which is attributed to sulphur precipitation, occurs, so that collateral evidence might be forthcoming.

The waters at Luchon are classified as exciting and non-exciting, and the non-exciting are those which have been found to display the greatest radio-activity. The radio-activity of the alkaline sulphur waters is mentioned as a quality present at most of the Pyrenean spas, and at Luchon a special study is being made of the matter at the Pavilion Ch. Moureu. How far this property serves any therapeutic purpose is under dispute, and until some real evidence is forthcoming to contradict him, the observer will be quite free to maintain an attitude of scepticism. Radio-activity has now been detected in the waters of many spas, British and foreign, so that the material for investigation is forthcoming. Until such an investigation has

FIG. 6.



Façade of the Établissement, Luchon.

taken place, the claim for radio-activity will not move medical men to attribute particular value to the waters of a spa. The possession of a property whose significance is in doubt is quite desirable if trial proves its virtues, and it would be reasonable, in the absence of scientific proof, to attribute powerful influence to radio-activity upon empiric grounds; but no authentic records have yet been kept of cases which have been found amenable to waters displaying radio-activity, having proved obstinate to other treatment.

At the great *établissement* at Luchon there are 100 salles de bains, each with a dressing room attached and opportunities for utilising any particular water that has been prescribed. There are two *humage* installations, having 60 machines through which the vapour is brought directly off from the springs in exact accordance with medical instructions. Five springs in particular have been chosen for *humage* of a wide range in temperature and mineralisation. There are five salles for insufflation and pulverisation, with separate apartments for male and female patients, a gymnasium, and massage room, while Dr. Molinéry, director of the establishment, oversees a department of physiotherapeutics.

The waters at Luchon are found to be particularly applicable in chronic affections of the respiratory tracts, in the results of chronic rheumatism, in a large range of skin diseases, and in syphilis. All the chronic coryzas, sluggish glandular hypertrophies, atrophic rhinitis, and pharyngitis are thoroughly dealt with upon a well thought-out technique, special attention being paid to the early difficulties which follow inflammation of the Eustachian tube. Cutaneous affections are divided by the Luchon faculty into the irritable, such as eczema and prurigo, urticaria and herpes, which are more amenable to those springs which display the property of *blanchement*, while subjects with less irritable diseases, such

as psoriasis, acne and seborrhœa, and alopecia, take baths from the more stable sulphur springs. All the neuralgias, myalgias, and arthralgias of chronic rheumatism may improve under a course at Luchon, but the medical committee point out that the most favourable results are obtained where general asthenia, which rapidly yields to the environment of the baths, has been at the bottom of the mischief. Lastly, Luchon has a reputation for the treatment of syphilis, and experience to-day is that where a return is being made to mercurial treatment the administration of the drug is greatly enhanced in rapidity and permanent benefit if the accompanying cachexia has been removed by a thorough and suitable course of the baths.

The season at Luchon lasts from the middle of May till the middle of October. There has recently been built at a height of 6000 feet, on a plateau above Luchon, a large and luxurious hotel, and at Super Bagnères, a mountain air cure is provided for those convalescents whose conditions demand it. The hotel, which is exactly similar to the one alluded to at Font-Romeu, is beautifully appointed, and not only gives accommodation to convalescent patients from Luchon, but is rapidly developing as a centre for summer and winter sports.

Bagnères-de-Bigorre.

Bagnères-de-Bigorre, in the Hautes Pyrénées, has an altitude of 1800 feet, and a mild and humid climate. There are here, in addition to sulphur springs of various temperatures and content, iron and arsenic springs, and the range of disease which can be successfully treated is extended. As at St. Sauveur, uterine affections receive particular attention, the iron appearing to have qualities useful in the general conditions which are often present. At Bigorre chronic catarrhal troubles of the digestive tract are treated with marked success, and no doubt the solvent action of the alkaline sulphur waters here, as elsewhere, particularly when assisted by every mechanical means that can be thought of, does lead to the dispersal of tenacious secretions, rendering the application of other remedies more efficacious, the patient being also in a better position for healing by nature. Bigorre is a pretty and interesting little town, and the municipality has recently acquired a beautiful park, thereby much adding to the attractions of life for the patient. The season is from June 15th to Oct. 15th.

FIG. 7.

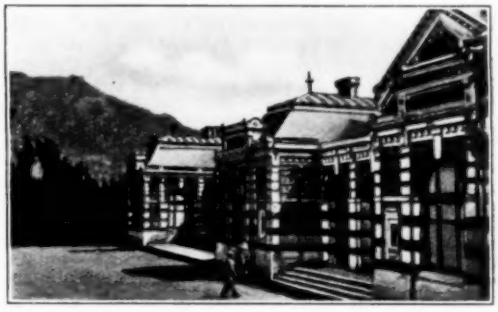
Cauterets—le Petit St. Sauveur.

Cauterets.

Cauterets has an altitude of rather over 3000 feet, but it has a mild climate, and is girdled by mountains which give shelter from changes in wind or weather. This *station*, like Luchon, is an historic spa, among its famous votaries having been Marguerite of Navarre and Rabelais. There are 22 springs whose waters are administered in nine *établissements*, the suphur and alkaline waters varying, as always, much in temperature and content. At Cauterets the action of the *sulphuraria* can be particularly well observed, notably at the spring which is named the Petit St. Sauveur, where the well-known properties of the St. Sauveur springs in the Luz Valley are duplicated. The two springs which supply the Petit St. Sauveur are remarkably soft and unctuous and rich in barégine, to the presence of which Prof. Landouzy has definitely attributed its eliminative influences and its action on the muscular fibres of the uterus. Treatment at the Petit St. Sauveur is especially directed to a condition termed there—"biological fatigue"—the condition where sleep ceases to be restorative, and exhaustion is followed by internal troubles due to sluggishness of the functions of secretion.

The chief claim, however, of Cauterets to the wide support which it has had for so many years is success in the treatment of chronic catarrhs of the throat and nose. Singers, lawyers, and priests alike have benefited by the careful regimen and elaborate local treatment which can be obtained at Cauterets. The baths, douches, and general apparatus are excellent, while first-class accommodation can be obtained in a bright clean town, whose environment affords lovely views and every form of graduated exercise. The season is from the middle of May to the end of October.

FIG. 8.



Argelès-Gazost—the Établissement.

Argelès-Gazost.

This thermal establishment is quite small and has a shorter season than the others mentioned—namely, during the months of July, August, and September. The baths are established in a charming little town south of Pau, and in the immediate neighbourhood of Lourdes. It is of the moderate altitude of 1500 feet, sheltered in its valley from the winds of east and west, with equable climate and a high rate of sunshine. The waters have their source in two springs and have a wide range of employment, especially in chronic respiratory conditions and chronic rheumatism.

The little *établissement* is very well furnished, and stands on the edge of a pretty park. The two springs vary somewhat in character, and analysis has shown them to contain, in addition to sodium and calcium sulphide and sulphuretted hydrogen, traces of iodine and bromine. The Source Noire, which is the richer spring, is used for cutaneous diseases, and the Grande Source for baths, inhalations, and at the *buvettes*. Both waters are cold and stable, qualities which fit them for transportation, and render them less exciting than the thermal waters.

Pau and Biarritz.

At these two famous health-resorts, which are only referred to in their connexion with the Pyrenean spas, a certain number of patients are advised to remain to complete their cure. Pau is well known for its restful qualities, and Biarritz for its more bracing character, and each provides a winter season for the delicate and convalescent. At Biarritz there is an establishment, the Hélianthe, which ought to be more widely known to medical men. Half hotel

or pension, and half sanatorium, it is a big building on the top of the cliffs south of the town proper. Two medical men, Dr. Plantier and Dr. Dausset, are responsible for the management of the Hélianthe and the medical care of the inmates. Excellent arrangements for bath and massage are supplemented by a good gymnasium, elaborately fitted up for therapeutic exercises. Sea-bathing can be obtained immediately below the institution from a quiet sheltered *plage*, while those whose health permits, and who wish it, can, by a gentle walk of five minutes or so, reach the *vieux port*, the most popular bathing beach of Biarritz.

A FEW GENERAL CONSIDERATIONS.

The efficacy of alkaline sulphur waters in the treatment of those groups of diseases which all the Pyrenean spas, with certain special variations, set out to treat, cannot be in doubt. The limitations of the good done are dependent, it need hardly be said, upon such general circumstances as the nature and stage of the disease, and such special circumstances as the constitution and adaptability of the patient, for whatever malady he or she may be seeking a remedy. But stress should be laid upon the value in practical therapeutics of these well-known spas, because the prescription of a course of them is still, from the medical point of view, somewhat empiric. The late Sir William Roberts, for instance, in the Croonian Lectures[1] of the Royal College of Physicians of London for 1892 brought evidence to show that in diseases where accumulation of uric acid in the blood is a main feature, alkaline salines are less efficiently solvent than pure water. But Dr. Fortescue Fox[2] finds, that in gout dependent upon some perversion of intimate tissue changes, perhaps inherited, sulphuretted waters appear to have an almost specific effect, instancing experience at Strathpeffer; while the cold salt, sulphur, and chalybeate waters of Harrogate are notoriously alterative in gouty conditions. The actual chemical action of sulphur has been explained in different terms at different spas, and must be considered still to require elucidation, but the good effect of the alkaline sulphur springs in certain pathological states cannot be put down to the environment of the *établissement*, its mechanical equipment, or the regimen enforced at it, to the exclusion of chemical agencies.

All testimony to the enormous influence of well-conducted spa life can here be taken for granted. It is waste of time and space in a medical journal to point out the results in many states of disease, quasi-disease, and commencing or disappearing disease, of a complete break in habits. And if that break is accomplished in the most favourable climatic circumstances, and under a discipline which gives confidence and calm to the patient while administering to him actual remedial help, general and local, the effect may be magical. For these reasons the alkaline sulphur waters of the Pyrenees have received for many years, and will continue to receive, the support of the medical profession, while it puts an onus upon those who conduct spa practices to develop both the material and scientific side of their undertakings. Hand-in-hand with the new buildings and plant, projected in association with railway developments in the Pyrenees, there should be some organised collaboration for the elucidation of some of the scientific problems. If certain springs at several centres manifest the same variety in content, the claims that this variety has special efficacy might be tested upon comparable groups of patients. At Font-Romeu a laboratory for consideration of the factor of high altitude has been instituted; it need hardly be said that the force of the observations here would be more than doubled by the institution of a similar laboratory at Super Bagnères de Luchon, where the altitude is much the same, but where certain differences prevail both in climate and in subject. And assuredly the whole question of the influence of radio-activity ought to be gone into in this collective manner. Over 18 years ago the discovery by Sir William Ramsay of the radio-active conditions, prevalent in the waters of Bath, led to certain prognostications as to the therapeutic value of the discovery, and more recently articles in THE LANCET have speculated on the subject, notably one written in collaboration with Sir William Ramsay by the late Mr. S. A. Vasey, then in charge of the chemical laboratory of THE LANCET.[3]

We do not seem to have got much further than the tentative opinions then expressed. As a large group of the Pyrenean spas depend upon springs which are radio-active, and as this quality is much insisted upon in their own literature, it would be well to take an opportunity for distinguishing the special influences of such waters. The spas possess a journal, *La Presse Thermale et Climatique*, edited by Dr. R. Molinéry, of Luchon, who is secretary of the Syndicat des Médecins des Stations Balnéaires de France, in which observations could be recorded for the information of hydro-therapeutists practising elsewhere.

Full information as to details of travelling, hotels, and prices can be obtained from the Bureau of Special Information (Secretary, Mlle. Blaise), at the Office Français du Tourisme, 56, Haymarket, London, S.W. 1.

[1] THE LANCET, June 18th and 25th, July 8th and 15th, 1892.
[2] The Principles and Practice of Medical Hydrology, part iv., chapter xiv.

VIENNA.

(FROM OUR OWN CORRESPONDENT.)

A Sliding Scale of Medical Fees.

THE incessant fall in the value of money has rendered the position of the medical profession more and more difficult. The custom of presenting yearly and half-yearly accounts is still followed by practitioners; thus, when the latter receive their money its buying power is considerably less than it was when the services were rendered. A year ago attempts were made to regulate conditions, but without effect; not until the practitioners' organisation took the matter up was a uniform procedure ensured. The following rules were laid down and are now being adhered to both by the doctors and the public: (1) Foreign patients to be charged according to the rate of exchange and in their own currency, paying about 50 per cent. of the fee they would be charged by their own medical men. Austrians to pay according to an index figure published monthly by the organisation. At present it is not possible for a doctor to charge fees proportionate to the actual increase of cost of living; a marked drop in the number of private patients is already noticeable. Specialists, who in peace times charged two or three times as much as the ordinary practitioner, now charge 50,000 to 75,000 kronen for each consultation at a surgery, and twice as much for a call at the patient's home; thus the limit seems to have been reached, for although these fees are only equal to from 3*s.* to 10*s.*, they are already exorbitant for our conditions. This illustrates the pauperisation of the Austrian population. (2) The organisation to inform the public, by means of notices in the daily papers, that medical attention should be paid for within at most four weeks. A longer delay after receipt of the bill to entitle the doctor to renew the account and charge a higher fee according to the altered index. The professional position was upheld in a test case in the law courts during an action brought against a patient who neglected to pay early and later refused to settle his account at a higher figure. The public have acquiesced in the arrangement. (3) A specified tariff of treatment to be published, relating to every class of work done by general practitioner or specialist. Thus each patient may at a glance find out the minimum cost of consultation, any operation, a night call, a subcutaneous injection, a midwifery case, &c. This tariff is chiefly worked through sickness insurance organisations, but

[3] THE LANCET, March 16th, 1912, p. 746.

private patients are also dealt with. Thus, unless the general financial situation of Austria is seriously altered, the problem of medical fees may be regarded as settled.

Assistance for Retired University Professors.

The economic conditions of retired members of the university staff, lately deplorable, have now been improved, thanks to the work of the Society of Friends and of the American universities, and to a belated realisation by the Austrian Government authorities of their responsibility in the matter. In peace time retiring professors received an income of at least £600 a year, but for some time after the break-up of the Empire their position was one of great privation. Those who were able to obtain posts in foreign universities did so; those who remained were for a time actually short of necessary food, until the establishment of a special restaurant where all present and retired members of the university staff could obtain a decent meal twice daily at nominal cost. The American universities are responsible for this restaurant, and they have also brought the retired pensions to a figure which enables the recipients to live very simply without fear for the future. The Society of Friends continues to supply food and clothing to them at small cost, but books and journals, and the most modest holidays away from Vienna, are still beyond their means. Even now the specialists in theoretical sciences are in a far from satisfactory position. Among the retired professors and teachers, the medical men came off best, for they were always able to add a little to their pensions by private practice; and to the honour of the profession in Vienna, in many instances practitioners took care to call them into consultation.

An Outbreak of Scabies in an Industrial District.

During the last few years scabies has become very troublesome in various parts of the Republic, in several instances assuming large proportions. In the industrial district south of Vienna infection became so frequent that the American Child Relief Organisation was unable to proceed with its work of distributing daily free meals to underfed children. An energetic attempt was made to get rid of this pandemic; in all villages and factories notices were posted stating that from a given date free medical help would be available for all affected persons, and everyone was urged to appear for examination. One of the public baths in Berndorf, at the centre of the industrial district, was set aside for disinfection purposes. Applicants were examined in a large waiting-hall; the infected persons were smeared from head to foot with a preparation consisting chiefly of Wilkinson's ointment, and remained covered by blankets for three hours. Then followed a hot bath, a second rub with ointment, and another bath. Meanwhile, the clothes and linen of the patients were disinfected by steam in the adjoining disinfecting plant. This "rapid cure," as it was termed, lasted six hours; persons suffering from eczema were, of course, first treated for that affection, and disinfected only when free from eczema. Within a week more than 2000 persons were dealt with without serious interruption of their occupation in the factory. Disinfection was carried on for 12 hours a day; a medical man, three nurses, and six attendants were kept continuously busy for three weeks. It was decided to keep the process going for a few months in order to free the whole district of scabies, but it was found necessary to continue the work on three days a week for over a year. Infected persons have now ceased to appear, and the institution could be closed. In Vienna several similar stations were established, and of these all but two are now closed.

Oct. 10th.

Dr. G. Arbour Stephens, hon. cardiologist to the Welsh National Memorial Association, has been appointed to act in the same capacity for the county of Carmarthenshire.

Correspondence.

"Audi alteram partem."

HOSPITAL TRADING.

To the Editor of THE LANCET.

SIR,—Hospital managers are indebted to Mr. H. J. Waring for the views he has expressed in his oration before the Medical Society of London on the question of the maintenance and management of voluntary hospitals, published in your issue of Sept. 30th. It is seldom that one finds a distinguished member of the honorary medical staff interesting himself in the lay side of hospital administration, and with all he says I most heartily concur with one exception.

The point upon which I am not in agreement is in regard to the department which is responsible for raising money having nothing to do with the spending of it. I venture to think that it is only those who know the terrible effort necessary to provide the income who will exercise true economy in spending it. The department that raises income should, I feel convinced, be fully aware in detail as to how the money is spent and be able to advise as to the best way of making use of whatever is available.

Great change has come about when a surgeon at Bart.'s can advocate not only payment by patients but actual trading to raise funds for the hospital—running a paying hospital in order to make profits to support the voluntary hospital. Mr. Waring quotes an instance where paying wards have been added to a hospital with the result that £10,000 a year in profits has become available for this purpose.

This points to further extension. The pharmacy unit can be enlarged and drugs sold to the general public. The pathological department can be made a paying concern by extending its scope and making vaccines and examining specimens for public bodies, general practitioners, and others. The massage and X ray departments can be extended in like manner. All can be run at a profit in the interests of the hospital, but beyond this there is the advantage that the departments will be larger and cover a wider scope, more persons will be employed, and more liberal remuneration paid to the professional and subordinate personnel, while opportunities for research will be extended. Thus each of these departments instead of being an expense to the hospital, will be helping to finance the parent institution.

It is the advance of medical science and the cost entailed thereby that has paralysed the voluntary system, and here is Mr. Waring showing us the way out. Even if we do not make any large profit by this trading, even if we only make the departments pay their way, we shall have removed the burdens that have wellnigh crushed us. One is glad to think that the sanitary tower may be a thing of the past, but Mr. Waring dispels not only this but so many other prejudices that his oration should be read by every hospital secretary throughout the country.

I am, Sir, yours faithfully,

P. J. MICHELLI.

Seamen's Hospital, Greenwich, Oct. 16th, 1922.

THE CONTROL OF TINEA CRURIS.

To the Editor of THE LANCET.

SIR,—In the treatment of the above condition with araroba, Dr. Clement Dukes (THE LANCET, Oct. 14th) will find that the deleterious effect of this preparation on under garments may be practically eliminated by using a pigment consisting of a 10 per cent. solution of chrysarobin in the liquor gutta percha (B.P., 1885). This is applied with a brush twice a day for 10 days and finally washed off, the treatment being repeated if necessary. I am, Sir, yours faithfully,

Ramsgate, Oct. 14th, 1922. S. E. AMOS.

THE DIFFERENTIAL DIAGNOSIS OF SMALL-POX AND CHICKEN-POX.

To the Editor of THE LANCET.

SIR,—At the season favourable for the spread of small-pox, of which 21 recent cases in and near London have yielded seven deaths, and several at first were taken for chicken-pox, it may be of service to utter a reminder and to mention that the diagnostic criteria which have proved in practice to be the most reliable in differentiating some 500 cases of chicken-pox, mostly adults, from among about 11,000 cases of small-pox and similar diseases in London during the last 20 years, are four in number—namely: (1) The presence or absence of marked general prostration in the early stages; (2) the relative density of the eruption on irritated surfaces; (3) the relative depth of the lesions in the skin; (4) the progressive maturation of the lesions; and that, as any acute febrile attack however mild may in reality be small-pox, every such illness calls for an examination of the skin and buccal mucosa for hæmorrhages, papules, pocks, or other blemish, in order to prevent the escape of a case which, however trivial in itself, may yet occasion many fatalities.

I am, Sir, yours faithfully,

W. McC. WANKLYN.

Luxemburg-gardens, W., Oct. 16th, 1922.

THE MECHANISM OF THE COCHLEA.

To the Editor of THE LANCET.

SIR,—My attention has been called to Dr. E. W. Scripture's criticism of the resonance theory in THE LANCET of Oct. 7th under the above heading. If I understand aright, he states that spoken vowel sounds are not amenable to analysis by a series of resonators inasmuch as musical quality is absent from them, or at least very weak in comparison to the element of noise. His difficulty therefore resolves itself into a special case of the question of how noises as distinct from musical sounds can be analysed. Naturally the problem in this larger sense presents no element of novelty, as any theory of sound perception that failed to furnish an explanation of how different kinds of noises can be discriminated would be incomplete indeed! A distinctive noise must give rise to a characteristic wave-form in the air, or how can it be distinctive? Fourier's theorem proves mathematically that any progressive wave-form can be built up by the compounding of a number of harmonic waves or sine curves. The characteristic wave-form of any distinctive noise must therefore contain characteristic harmonic components. These will be picked up by corresponding resonators in the cochlea. They will be analysed just as are musical sounds. Noises, of course, possess pitch, or rather pitches, but these pitches are not so distinctly perceptible as in the case of musical sounds. The maximum points of stimulation along the basilar membrane are crowded together and the discrimination of pitch is consequently imperfect. This view as to the perception of the characteristics of noises was admirably worked out by Albert Gray in 1900. Your correspondent may easily convince himself that vowel sounds are capable of being resonated by performing Ellis's experiment, which consists of speaking the different vowels forcibly into an open piano, with the dampers raised. The piano-strings reproduce the characteristics of the vowels quite distinctly by resonance.

The "crucial test method" has had no success, so far as it has been applied to the solution of the difficult problem of sound perception. Over and over again we find the same observation or experiment used as a conclusive argument on either side in exactly the opposite sense. Mr. Hartridge's experiment, quoted by your correspondent as an argument against the resonance theory, was, I believe, devised by its author in support of that theory. The "noise analysis" argument similarly may be quoted in favour of the resonance hypothesis. Other theories of sound perception have given plausible explanations of tone perception, but no theory other than the resonance theory has furnished any explanation of the *analysis* of compound sounds into simple tones which has been able to stand criticism.

It is quite natural to doubt whether the cochlea resonator can possibly accomplish all that we know by observation that the sound-perception mechanism can do in the way of sound analysis. The limitations of the cochlea resonator are determined by factors which are very difficult to estimate, as, for example, the delicacy of its response to stimulation, the sharpness of differentiation in its resonant action, and the perfection of its damping. I would suggest that it is better to concentrate in the first instance on the obvious and to leave the more recondite factors to fall into line afterwards, as they assuredly will if the foundations of the theory are sound. We have some solid ground to go upon. We find in the cochlea all the elements essential to a series of resonators: progressive differentiation, in length, tension, and mass, each factor being differentiated in the same sense. We can in a crude manner embody these factors in a working model, and we get some sort of clumsy caricature of the working of that marvellously delicate instrument of precision, the cochlea. But it is unquestionably resonance that we get. Consequently, if our model has represented the mechanical factors fairly, it follows that similar resonance effects *must* take place in the cochlea. It is not conceivable that nature should evolve such an elaborate resonance mechanism except by means of, and for the purpose of, increasingly accurate analysis of sound.

I am, Sir, yours faithfully,

Sheffield, Oct. 12th, 1922. G. WILKINSON.

PROVISION FOR THE SUBNORMAL EX-SERVICE MAN.

To the Editor of THE LANCET.

SIR,—Dr. R. Fortescue Fox has done a public service in bringing to the notice of the medical profession the need of this provision. May I take the opportunity of stating that of all subnormal ex-Service men, the tuberculous ex-Service man is perhaps in the most parlous condition? From time to time I have, in collaboration with Sir Clifford Allbutt and with the late Sir German Sims Woodhead, contributed articles to your journal under the heading "Experiences in Colony Treatment and After-care." Again and again we have sought to emphasise the impossibility of the consumptive substandard man competing with the healthy worker, and advocated the village settlement as a solution of the problem. We used such phrases as these:—

"If a patient is capable of doing only 60 per cent. of the work of a normal man, it is only courting disaster to attempt to place him amidst his old surroundings and without assistance in competition with the strong, full-blooded worker. To send him back to such surroundings with a pint of milk a day would seem humorous if it were not so tragic. It is inadequate, unscientific, senseless." (THE LANCET, Nov. 24th, 1917, p. 779.)

"A partially trained man, which is all that a re-educated consumptive can hope to be, cannot find a place in the open labour market. Trades unions are against him, employers have no use for his labour." (*Journal of State Medicine*, January, 1920, p. 12.)

We pointed out that no temporary expedients would meet the situation, that placebos were wasteful and harmful, that the problem must be met and solved by business methods combined with medical skill. Let us face the facts squarely—the light open-air job is a myth—the partly-trained consumptive cannot be employed in the open market. It is waste of public money to train a man unless such training is followed up by permanent employment under conditions suitable to the man's diseased condition. The question now pressing for solution—the industrial employment of the substandard man—can only be met as Dr. Fox points out, and as we have demonstrated at Papworth.

"Let communities be started in which our consumptive soldier can live in his own home, shielded from the fierce

competition of the outside world, a self-respecting worker, an economic asset. Let employment be found, the model factory erected, the hours of toil properly regulated, a fair wage paid." (A Plea for the Consumptive Soldier. Reveille No. 2, 1918.)

Such a community has been started:—

"An environment has been formed in which the diseased person, not merely the diseased tissue, may be healed and live without detriment or fatigue." (Cambridgeshire Tuberculosis Colony Annual Report for 1921, p. 19.)

Papworth industries now have consumptives in permanent employment as clerks and accountants, mechanics, painters, glaziers, signwriters and decorators, ticket and show-card writers, printers, carpenters and joiners, bricklayers, plasterers, cabinet makers and packers, trunk and portmanteau makers and makers of leather goods, boot repairers and surgical boot makers, tailors, jewellery makers, watch repairers, gardeners, poultry farmers, and pig-keepers.

It has here been found that the substandard man can be employed under the sheltered conditions of the village settlement. Dr. Fox's appeal should, therefore, not be in vain.—I am, Sir, yours faithfully,

P. C. VARRIER-JONES,
Medical Director, Papworth, Cambridgeshire.
Oct. 12th, 1922.

ENHAM VILLAGE AS A CENTRE FOR SUBNORMAL MEN.

To the Editor of THE LANCET.

SIR,—In view of the recent correspondence in your columns on the subject of provision for the subnormal ex-Service man, I am venturing to append a few particulars of the Enham Village Centre, which was then referred to.

It was stated that if Enham could become the pioneer demonstration-centre for the application of new and scientific methods, upon an economic basis, to the varied needs of subnormal workers, it would do as great service as it did in demonstrating the hitherto unrealised merits of combined treatment and training; and I am writing to point out that lack of funds is now the only consideration standing in the way of the accomplishment of this service. We have been offered £10,000 on condition that we are able to collect a further £20,000; and of this sum well over half has been secured. The total £30,000 would suffice to establish the nucleus of an almost self-supporting community of subnormal men, and enable Enham to become the demonstration-centre whose existence and experience would contribute largely towards the solution of this national problem.

In inviting the support of your readers for this work I would conclude by saying that, although I have been connected with many war charities, I know of none whose work is more practical or more valuable, both actually and potentially, than that of Enham; and, secondly, that any donations, however small, sent to me at 10, Upper Woburn-place, London, W.C. 1, will be gratefully acknowledged.

I am, Sir, yours faithfully,
FREDERICK MILNER,
Oct. 17th, 1922. Vice-President and Hon. Treasurer.

RAPID DIGITALIS EFFECTS BY ORAL ADMINISTRATION.

To the Editor of THE LANCET.

SIR,—Having read with much interest the article by Prof. Francis R. Fraser under the above heading (THE LANCET, Sept. 30th), I desire to make a few comments.

Eggleston's method of administration forms the text of Prof. Fraser's communication, and though the material which he himself supplies in support of the method is not large, yet it should suffice both to illustrate and to confirm the efficacy of the massive doses employed—viz., 3 drachms in 12 hours, thus distributed: first dose 1½ drachms, second dose 1 drachm, third dose ½ drachm, at intervals of six hours. My present purpose is not to question the value of Eggelston's method, but to draw attention to the fact that the production of rapid digitalis effects by oral administration is no new problem in practical medicine, and that as far back as 1875 a method for obtaining such results was devised and most carefully formulated by Dr. George W. Balfour in his clinical lectures on Diseases of the Heart. In Chapter XIV. of this work the action of digitalis is dealt with at length, and after first describing what he terms the *tonic* dose—i.e., a dose designed simply to improve the nutrition of the heart (such dose is small and should not, as a rule, exceed 1 gr. in 12 hours)—he goes on to say:—

"If, however, we wish to act more rapidly and decidedly on the heart and circulation we must—whatever dose be given—repeat it at short intervals, so that the action of each dose may be reinforced by that following it until the desired action is attained. This is the mode in which we employ digitalis when we wish to contract the heart, or to remove dropsy" (p. 343, second edition, 1882).

What are these doses? They range from 3–7 gr. of the powdered leaves, given at intervals of four hours. Dr. Balfour gives some preference to the tincture of digitalis and, translating the above doses into their equivalents as tincture, we have ½ drachm as the *minimum* dose (3 gr. of the leaves) to be given every four hours in order to get the cumulative therapeutic dosage. He says:—

"From one to three days subsequently, in cases of dropsy, the full effects of the drug may be expected" (p. 346).

Upon such dosage he warns us that we must be on the look-out for symptoms of saturation—i.e., toxic symptoms—and then adds:—

"But nothing but good will follow provided we stop the moment the urine falls, the pulse slows, or nausea occurs" (p. 345).

He lays particular stress on the diminution in the secretion of urine as a *controlling symptom*, insisting that when once this appears we must "stop the digitalis for 24 hours or more" (p. 346).

Thus administered and thus controlled, do the results obtained leave much to be desired? The whole of this chapter of Dr. Balfour's book is well worth studying even at the present day.

I am, Sir, yours faithfully,
HARRINGTON SAINSBURY.
Wimpole-street, W., Oct. 14th, 1922.

DEATH IN THE ALPS.

To the Editor of THE LANCET.

SIR,—Surely Dr. E. W. Scripture[1] shakes hands with the Dark Ages in assuring us that he has no doubt that his mountain climber to whom a fatal accident occurred, had fallen asleep near an abyss "because his unconscious mind wished to get the opportunity of carrying out its plan" of precipitating him into eternity while consciousness was dormant. This is the old doctrine of demoniacal possession revived, naked and unashamed. That a man may be possessed by a familiar spirit or a cunning demon (call it his Unconscious Mind if you will; names are merely labels, and they may be shuffled without alteration of the things they designate) that waits until its master—soon to become its victim—is lulled in sleep, in order to hurl him into eternity, would have warmed the hearts of the old bygone witch-hunters.

It is instructive to compare the case that Dr. Scripture quotes from Flournoy of Geneva with the Scriptural one reported by St. Mark and, more briefly, by St. Matthew of an epileptic deaf-mute[2] who was possessed by a devil[3] from childhood:[4] "and ofttimes it hath cast him into the fire, and into the water to destroy him."[5] The purposive malignity of the devil (or the Unconscious Mind—plus ça change, plus c'est la même chose) in the two cases is identical.[6] If one

[1] THE LANCET, Sept. 16th, 1922, p. 640.
[2] Mark ix. 25.
[3] Matt. xvii. 18; Mark ix. 17–18, 20, 25–26.
[4] Mark ix. 22. [5] Mark ix. 22.
[6] The lost Faustus in the grip of the fiend presents another aspect of the subject.

admits the reality of the malefices of Dr. Scripture's "unconscious mind," one cannot afford to say one single word against the doctrine of possession by devils. Indeed, all the hard words that have been uttered against the divines with regard to this matter must be retracted; and we must hope that they do not retort on us by sending back some of the epithets that have been so freely hurled at them (gullible, credulous, reactionary, unscientific, and so on, ad nauseam).

But does Dr. Scripture claim that the "Unconscious Mind" is the devil? Milton[7] has assured us that—

> The mind is its own place, and in itself
> Can make a Heaven of Hell, a Hell of Heaven;

but is it Satan who speaks, not merely in Milton's poem, but whenever vain promptings from the unconscious are perceived? If this is any approach to the faiths of modern medico-psychologists, then the sooner we get back to the standpoint of St. James[8] the better, with regard to patients subject to impulse, whether phobia or anxiety, active or repressed.

I am, Sir, yours faithfully,

Manchester, Oct. 10th, 1922. W. J. RUTHERFURD.

URTICARIAL CONDITIONS AND EOSINOPHILIA.

To the Editor of THE LANCET.

SIR,—The conditions in which one commonly finds eosinophilia are: (*a*) parasitic infestations—e.g., filariasis, schistosomiasis, intestinal helminthiasis, &c.; (*b*) cases of food poisoning; (*c*) cases of urticaria; and (*d*) asthma. Of these, there is a definite toxæmia in (*a*), (*b*), and (*c*). In (*d*) the part played by certain articles of diet in the precipitation of an attack is well known, especially that of a fairly heavy meal partaken late at night.

When I was in the Falkland Islands I remarked upon the frequency of asthma, both in persons born in the colony and among those who had settled there from the United Kingdom. I also had occasion to remark upon the prevalence of oral sepsis, especially among the subjects of asthma. In the Falklands, which have been called "the land of tinned milk and imported honey," a very large quantity of preserved foodstuffs is consumed. The association between urticaria and the ingestion of certain articles of diet—particularly if some of these are not absolutely fresh—is well known; as is that between urticaria and various gastro-intestinal disturbances. The connexion between angio-neurotic œdema—the so-called "giant urticaria"—and acute gastro-intestinal trouble will be recalled (in this connexion it may be mentioned that I once rescued a sergeant, who was about to be opened as an acute abdomen, actually from the operating table, because I knew him to suffer from angio-neurotic œdema, and in 24 hours the symptoms had subsided). I know of two definite cases of angio-neurotic œdema in which there was no family history of the disease, and where the first attack was definitely traceable to the ingestion of poisonous foodstuffs. One of these can still be produced.

An urticarial condition of the bronchial mucous membrane is described in asthma. I have treated cases of asthma over and over again as toxæmias by the exhibition of saline aperients, the removal of local sources of infection (pyorrhœa, tonsils, accessory sinuses, &c.) with excellent results. The effect of toxæmias on the endocrine organs seems now to be well known.

I no longer have any opportunities for clinical work, and it is more than likely that my knowledge of recent literature is hopelessly out of date; but these facts seem to me to be significant. The eosinophilia, which is known to be so often definitely associated with a toxæmia; the likeness between urticaria and "angio-neurotic œdema"; the urticarial condition of the bronchial mucous membrane in asthma; the connexion with gastro-intestinal disturbances. Many of the cases I have seen suggest an exudative bronchiolitis rather than a spasmodic contraction of the bronchioles; a blocking of the smaller bronchioles with thick viscid mucus—possibly the precursor of "Curschmann's spirals"—rather than an actual diminution of their lumen. In fact, when I think of the histology of the bronchioles I often wonder whether it would be *possible* for their unstriped muscle fibres to bring about a degree of contraction sufficient to account for the severity of the symptoms.

I am, Sir, yours faithfully,

H. M. STANLEY TURNER,
Wing Commander, Royal Air Force Medical Service.

Cairo, Sept. 4th, 1922.

[7] Milton: Paradise Lost, 1667, i., 254–255. Compare Spenser, Faerie Queene, 1596, vi., § 9: "It is the mynd that maketh good or ill."

[8] James v. 15.

The Services.

ROYAL NAVAL MEDICAL SERVICE.

Surg. Rear-Admiral Sir D. J. P. McNabb placed on the ret. list.

ROYAL ARMY MEDICAL CORPS.

Lt.-Col. H. B. G. Walton retires on ret. pay.

RESERVE OF OFFICERS.

Maj. E. M. Williams, having attained the age limit of liability to recall, ceases to belong to the Res. of Off.

TERRITORIAL ARMY.

Capt. W. J. Richards, having attained the age limit, is retd. with the rank of Maj., and Capt. W. H. E. Stewart, having attained the age limit, is retd. with the rank of Capt.

Maj. J. C. Grieve resigns his commn. and retains the rank of Maj.

Capt. W. A. Milner resigns his commn. and retains the rank of Capt.

TERRITORIAL ARMY RESERVE.

Lt.-Col. J. MacMillan resigns his commn. and retains the rank of Lt.-Col.

Lt.-Col. E. T. Burke (late R.A.M.C., Spec. Res.) to be Capt., and relinquishes the rank of Lt.-Col.

Maj. L. A. Mackenzie, from Genl. List, to be Maj.

Capt. F. T. Rees to be Maj.

The undermentioned offrs., having attained the age limit, are retired, and retain their rank except where otherwise stated: Maj. J. Scott (granted the rank of Lt.-Col., with permission to wear the prescribed uniform), and Majs. H. C. Parsons and W. V. Sinclair (granted the rank of Lt.-Col.), Majs. C. A. C. Smelt, G. Black, A. A. Martin, and G. R. Wilson (with permission to wear the prescribed uniform), and Majs. C. Thomson and P. E. Barber; Capts. H. Connop, C. W. J. Brasher, and C. D. Law (granted the rank of Maj.), and Capts. E. H. Scholefield, A. H. Davis, H. N. Collier, C. G. Tench, J. L. Baskin, P. W. Kent, R. D. Gawn, and H. W. Case.

Genl. Hosp.: Capt. A. J. Brown, from Genl. List, to be Capt.

ROYAL AIR FORCE.

C. Y. Roberts is granted a short service commission as a Flight Lt.

Lt. N. F. Smith, Dental Surgeon, General List, Army, is granted a temporary commission as a Flying Officer on attachment for four years' duty with the R.A.F.

Flying Officer (Hon. Flight Lt.) B. C. W. Pasco to be Flight Lt.

Flight Lt. T. H. K. MacLaughlin relinquishes his temporary commission on ceasing to be employed.

INDIAN MEDICAL SERVICE.

The King has approved the resignation of Lieut. H. Donovan.

THE TERRITORIAL DECORATION.

The King has conferred the Territorial Decoration upon the undermentioned Officers: Col. C. Averill; Lt.-Cols. O. L. Appleton (ret.), G. N. Biggs (ret.), F. Hawthorn, J. W. Keay, and A. Ogston; Majs. J. Allan, W. Duncan, A. H. Falkner, W. H. Fisher, R. B. Purves, and A. B. Sloan (ret.); and Capt. E. M. Douglas-Morris. Territorial Army Reserve: Lt.-Col. W. T. Rowe and Maj. J. D. Fiddes.

Public Health Services.

INSURANCE PRACTICE AND APPROVED SOCIETIES.

To judge from a number of newspaper reports which reach us, it would almost seem that there is a definite campaign amongst certain leaders of the approved societies to vilify the so-called panel practitioner and to disparage the insurance service. No opportunity has been lost at conferences or meetings to get the ear of the lay press in order to publish the dissatisfaction of the officials with the present system. To take a recent instance—at the annual meeting of the National Association of Insurance Committees the retiring president, Sir Alfred Warren, M.P., is reported to have said that "panel patients get much worse treatment than did the members of friendly societies under their old arrangements with the medical profession, and there was serious complaint of the way in which the panel patient was treated as compared with the private patient." Statements such as this have provoked the Medical Secretary of the British Medical Association publicly to retort: "Some representatives of friendly societies talk nonsense." No doubt exists in the minds of informed and impartial persons that the present insurance system is a vast improvement on the old club system which it replaced.

Sir Alfred Warren went on to allege a growing conviction that the regulations with regard to medical benefit should be amended so as to make the fullest and best medical treatment and attendance available to insured persons and, as soon as circumstances admitted, to their dependents. What does this statement imply? That the general practitioner treatment is not the fullest and best and that regulations can be framed to make it so? Or if it refers to the extension and development of the medical service it should be read alongside what Mr. L. G. Brock, of the Ministry of Health, said at the same meeting: "The inclusion in medical benefit of major operations, specialist and consultant services, hospital facilities, and laboratory diagnosis .... would add at least a third to the present cost; and that could only be met by a State subsidy or an increase of contributions." Mr. Brock added that in his view a State subsidy in the present position of national finance was out of the question. Presumably the difficulty is to be met in the way indicated by the Worcester Insurance Committee, who think that "most laymen will agree with them" in regarding the present capitation payment as adequate. This committee, however, foresee that "*if the doctors are to pay for operations, specialists, and so forth*, there may be a reluctance, here and there, to advise such things." The picture is indeed a terrifying one of the position into which the societies would like to manœuvre the professional man. Their idea of the general standard of professional conduct is sordid in the extreme. And yet it is these people who claim the right within 12 months to consider the capitation fee and to fix a new one to operate when the present agreement terminates on Dec. 31st, 1923.

In welcome contrast is the attitude of such a professional man as Sir William Glyn-Jones, who paid a tribute to the work of the medical practitioners and to the remarkable services which they had rendered to the insured public, "who," he said, "had received treatment such as was impossible for them to obtain in pre-insurance days." The full danger of the campaign is ably shown by Dr. Ridley Bailey in his speech on Oct. 10th at the annual dinner of the Coventry Division of the British Medical Association. He then revealed the fact that the report of the executive council of the Association of Insurance Committees contained the following clause: "The executive have taken preliminary steps with a view to arranging for a conference with representatives of approved societies to consider the question of negotiations with regard to the terms and conditions of service, including the remuneration of insurance practitioners." This prospect may stimulate to action the Conference of Local Medical and Panel Committees which begins its annual session to-day (Friday). It is high time to secure the coöperation of the consultant section of the medical profession. When the approved societies are seriously suggesting that general practitioners should carry out major operations and other specialist services there is no time to lose.

Obituary.

EDWARD COLLETT HORT, F.R.C.P. EDIN.

THE death after a long illness of Dr. E. C. Hort, on the French Riviera on Oct. 15th, has removed a medical man of original intellect and charming personality. Son of Prof. F. J. A. Hort, of Cambridge, renowned as a theologian, Edward Collett Hort was born in 1868, and was educated at Sherborne School, Emmanuel College, Cambridge, going on to Guy's Hospital, London, for his clinical studies, where he qualified L.S.A. in 1896. After a prolonged period of adventure abroad and some experience in medical practice on the Riviera, he returned to England to become, in spite of bad health and increasing family cares, a laboratory worker of almost feverish activity. His early study on autolysis due to proteolytic substances in the blood led him first to advocate the use of horse serum in various hæmorrhagic conditions and then to an elaborate method of immunisation against pulmonary tuberculosis. Research work, carried out in Sir Lenthal Cheatle's private laboratory at King's College, was later transferred to the Lister Institute, where the Constance Trotter Fund placed a trained staff at his disposal. Hort's work there covered such a wide field as the diagnosis of cancer by examination of the blood, a critical study of experimental fever, and the ætiology of cerebro-spinal and typhus fevers. His investigation of the infecting agent of the latter with Dr. W. W. Ingram led in 1914 to the description of a filter-passing organism possessing a large and harmless bacillary phase. An appointment at the Italian Hospital and a considerable consulting practice kept him meanwhile in touch with clinical work. During the war he was indefatigable in directing the bacteriological staff at the Addington Park War Hospital and there continued his work on the pleomorphism of infections such as the meningococcus. Although his view of the complex life-cycle of many bacterial forms did not gain general acceptance, the ingenuity and suggestive nature of his work received generous recognition from Prof. J. G. Adami and obtained for him an important position as member of the Advisory Council for Medical Research attached to the National Health Insurance Commission.

While at Addington Park Hort contracted dysentery and was extremely ill; from this he slowly recovered and, after serving as temporary lieutenant-colonel in charge of a convalescent hospital on the Riviera, turned his energies into another direction, the invention of suitable foods for the starving Russians, as an interlude to the bacteriological work which it was his ambition to see overwhelmingly proved and accepted. But this was not to be; last year symptoms of visceral tuberculosis became urgent and the disease slowly gained on him. He leaves behind a devoted wife and two daughters, the elder of whom had for long assisted him in his work.

THE LATE DR. HERBERT LANGTON.—The death of Dr. Herbert Langton, at Hove, on Oct. 12th, has removed from Brighton one of the oldest and one of the most esteemed members of the profession. He was a student at the Royal Sussex County Hospital in that town, and he afterwards went to St. Bartholomew's Hospital, where he took the L.S.A. diploma in 1877, and became M.R.C.S. Eng. the same year. He then returned to Brighton, where he became house surgeon at the Dispensary in Queen's-road, a position he held for several years. He then started in private practice, and soon acquired many patients. Herbert Langton was born in 1853, the son of Mr. W. J. R. Langton, of Wandsworth. He was keenly interested in photography, but his greatest hobby was the study of birds. He was a member of the British Ornithologists' Union, and in recent years held the chairmanship of the Ornithological Association of England. He was well known in Masonic circles.

PUBLIC MENTAL HOSPITAL ADMINISTRATION:
REPORT OF THE BOARD OF CONTROL.

THE Board of Control (Lunacy and Mental Deficiency) has just issued its eighth annual report[1] which deals with the calendar year 1921. This year proved to be the most difficult and anxious in the history of the Board, for while on the one hand stringent financial conditions restricted expenditure to a minimum, on the other hand public opinion became focussed upon the treatment of mental patients with insistent demand for revision of their care which could only be made effective with great outlay of money. The Geddes Committee, it is true, refrained from recommending any reduction in the provisional estimate for contributions to local authorities under the Mental Deficiency Act, 1913, but the simple policy of "carrying on" implies the continuance of this Act largely as a dead letter. But while little capital expenditure was permissible conferences and deliberations took place which will necessarily exert wide influence on the administration of the Lunacy Act and on the treatment of persons suffering from mental disease, while departmental committees have been appointed to go into the questions of nursing and personnel. These conferences have been reported in our columns as they occurred.

With regard to the magnitude of the work for which the Board of Control is responsible, it may be noted that on Jan. 1st, 1922, the number of notified insane persons under care in England and Wales was 123,714, being an increase of 3370 on the number of the twelvemonth previous. This increment, however, was not chiefly due to increased admissions but rather to the very low number of deaths occurring in institutions for the insane. The death-rate in 1921 of 8·37 per cent., calculated on the daily average number resident, was, in fact, the lowest rate ever recorded by the Board; to some extent, no doubt, it is the natural sequel of the very high death-rate in the years about 1918, when rigorous conditions of institution life killed off a number of patients who would normally have lived at any rate for a few years longer. The recovery-rate during the year, calculated upon total direct admissions, was 32·52 per cent., being appreciably higher than the average for the preceding decade. The resumption of full medical records, largely suspended during the war, has made it possible again to prepare the usual tables dealing with the causes of insanity. These tables have not been printed but are filed at the office of the Board for reference. Their value is admittedly diminished by the crying need for a revision in the nomenclature of insanity. From the summary which is given in the Report it may be noted that the factor of prolonged mental stress appears to be responsible for 8 per cent. more breakdowns in males and 4 per cent. in females than in the pre-war years. Insane heredity seems to have counted 5 per cent. less in males, while alcoholic heredity and alcoholism are stated as diminishing factors in an extraordinary degree. In 1920 alcoholism and inebriety yielded a rate amongst females only one-half that in 1909–13.

The total expenditure during the year on county and borough mental hospitals, including maintenance and treatment of patients, amounted almost to eight million pounds, and the average weekly cost per patient to 28*s*. 1½*d*., being an increase of 5*s*. 9*d*. upon the previous year. The chief increase for the year is under the heading of salaries and wages, an item which the Board expects to be reduced next year in view of the fall in war bonuses. The question of suicide among mental hospital patients receives attention in the Report. The result of the greater liberty and freedom now being prescribed for mental patients, as part of the measures required for recovery of mental balance, naturally is seen in greater opportunity for attempts at self-injury. The Board, being convinced that the evil to the few is far outweighed by the greater good to the many, is prepared to assist medical superintendents in every possible way should suicide occur, offering to give evidence at any inquiry that the greater freedom had been provided at the Board's express desire. As a matter of fact, 32 patients died during the year as the result of a suicidal act, but only in 18 cases were they actually in residence at the time. In one case of death from scalding a suggestion is made for greater precaution.

The Report contains a short but valuable section upon the certification of voluntary boarders in registered hospitals and licensed houses. The treatment of early mental disease is so closely bound up with such voluntary boarding that its smooth running is a matter of fundamental importance. Complaints have been made that voluntary boarders are not always fully informed of their legal position and of their right to leave on giving due notice to the superintendent. The board suggests a printed notice to be handed to each boarder on his arrival, and the avoidance of certification while in residence, unless absolutely necessary for the safety of the patient or for the protection of the public. Two prosecutions are recorded in the Report for ill-treatment of patients, both at the same hospital. In each case the attendants who had been convicted of striking patients were summarily dismissed from employment. In connexion with a death from scalding, for which two nurses were dismissed, the Report reveals the exceeding difficulty of getting at the actual responsibility. Although the facts ascertained are summarised in a few lines, they were only arrived at after prolonged and exhaustive inquiry, first by the coroner, later by the committee, and finally by a member of the Board of Control.

The incidence of infectious diseases in mental hospitals is set out at length. Ninety-one cases of enteric fever were notified during 1921, and the abnormal incidence of this disease amongst females in mental hospitals is suggested as a suitable subject for special inquiry and research. 238 patients died of dysentery in county and borough hospitals, while there was no single death from this cause in registered hospitals or licensed houses, and no cases were reported from three such large public institutions as Lancaster, Wandsworth, and Brookwood. The brief record of scientific research work in the Report indicates how carefully this question of dysentery in large institutions is being studied.

We have only indicated some of the main features in a Report of vital interest.

[1] H.M. Stationery Office. 7*s*. 6*d*.

ROYAL ACADEMY OF MEDICINE IN IRELAND.—The annual meeting was held on Oct. 13th at the Royal College of Physicians. The report of the Council records numbers of alumni almost identical with those of the previous year—177 Fellows, 8 Members, and 20 student associates. The finances show some improvement. It is noted that the title of the journal of the Academy has been changed from the *Dublin Journal of Medical Science* to the *Irish Journal of Medical Science*. During the year the Academy established an obstetrical research committee for the purpose of making collective investigations in connexion with obstetrics. Dr. L. Cassidy, master of the Coombe Hospital, is secretary of the committee. The Academy has recently lost two of its most distinguished Fellows—Sir Joseph Redmond and Prof. E. H. Taylor. On the nomination of the Council, Prof. Oskar Frankl, of Vienna, and Prof. E. H. Tweedy, of Dublin, were elected honorary Fellows. Twice within the past year Prof. Frankl, who is professor of gynæcology at the University of Vienna, has visited Dublin and lectured to the Academy. The election of Prof. Tweedy to an Honorary Fellowship of the Academy establishes a precedent, no previous ordinary Fellow having been so honoured. Prof. Tweedy's services to the Academy and to the Dublin School have been continuous and important. The proceedings of the Section of Obstetrics have been enriched by his contributions for many years past, and the advances in obstetric practice introduced by him, notably that in regard to the treatment of eclampsia, are adjudged of more than local value. Considerations of health will render it difficult for him to give the same service to the Academy in the future as in the past, and his election as an Honorary Fellow is a well deserved mark of esteem.

Medical News.

UNIVERSITY OF CAMBRIDGE.—Prof. H. Roy Dean has been elected to a professorial fellowship at Trinity Hall. The Gedge Prize for original observations in physiology has been awarded to Mr. F. J. W. Roughton.

At a congregation held on Oct. 13th the following degrees were conferred:—

M.D.—E. G. Lescher, Caius.
M.B.—H. L. Willey.
M.B. and B.Ch.—C. S. Atkin, Caius; and A. E. Roche, Magdalene.

At examinations held recently the following candidates were successful:—

SECOND EXAMINATION FOR MEDICAL AND SURGICAL DEGREES.
Part II., Pharmacology and General Pathology.—B. E. Ahrens, E. L. Auguste, G. W. Bamber, C. M. Barker, W. A. Barnes, C. O. Beane, I. C. P. Beauchamp, S. A. Belshaw, W. A. Bourne, C. W. Brook, G. H. Brown, C. B. Buckley, R. C. L'E. Burges, R. W. Butler, A. Carnegie Brown, A. N. Carruthers, W. E. Chiesman, J. E. Church, W. R. F. Collis, C. K. Colwill, W. F. Copper, W. S. C. Copeman, R. W. Cuningham, R. Cunningham, T. S. Dewey, M. S. Dewhurst, J. Dockray, C. E. Donaldson, R. W. B. Ellis, T. I. Evans, T. F. Everett, E. O. Fox, J. H. Gibbens, H. K. Goadby, F. Goldby, E. P. Gough, B. Graves, R. A. P. Gray, E. J. Greenwood, H. F. Griffiths, J. L. Groom, C. J. Grosch, K. H. A. Gross, W. S. Grove, R. F. Guymer, H. J. Heathcote, A. C. de B. Helme, J. D. Hindley-Smith, J. C. Hogg, A. T. Howell, J. T. Irving, D. McI. Johnson, W. E. Joseph, J. J. Keevil, L. A. Key, M. E. Lampard, W. E. B. Lloyd, T. F. McNair Scott, J. P. Marsden, F. Martyn, R. D. Milford, J. G. Milner, V. S. Mitcheson, E. D. Moir, E. G. Morris, J. D. R. Murray, H. P. Nelson, C. E. Newman, H. W. Nicholson, G. F. Oakden, C. L. Owen, L. J. Panting, R. W. L. Pearson, H. C. Pierce, C. G. E. Plumstead, J. D. Procter, P. E. Pym, J. H. Randall, A. M. Rhydderch, J. B. W. Roberton, R. P. Ross, G. L. F. Rowell, T. W. E. Royden, H. W. Sadlier, K. G. Salmon, H. B. Savage, S. W. Savage, H. Scudamore, E. M. Shackel, R. E. Smith, W. Smith, W. E. Snell, H. B. Stallard, G. M. Tanner, B. C. Tate, G. K. Taylor, E. J. E. Topham, E. A. Trim, C. I. Tuckett, J. G. E. Vachell, J. L. Warner, C. F. Watts, D. B. Wilson, H. G. Wimbush, R. M. Windeyer, L. B. Winter, J. T. Woodhead, and F. C. Wynne-Edwards.

UNIVERSITY OF SHEFFIELD.—The Council at its last meeting appointed Dr. Robert Platt as demonstrator in pathology and bacteriology.

UNIVERSITY OF MANCHESTER.—Prof. R. B. Wild has been appointed as representative of the University upon the General Medical Council, and Prof. W. W. C. Topley upon the Council of the Lister Institute of Preventive Medicine.

UNIVERSITY OF WALES.—At examinations recently held the following candidate satisfied the examiners in Medicine, Surgery (with distinction), and Obstetrics and Gynæcology: Eroica Rowe Lewis.

BRITISH PSYCHOLOGICAL SOCIETY.—A meeting of the Medical Section will be held at the Royal Society of Medicine, 1, Wimpole-street, London, W. 1, on Oct. 25th, at 8.30 P.M. Papers will be read by Dr. E. W. Scripture on Some Medical Novelties in Vienna and Nature and Treatment of Epilepsy.

GRESHAM COLLEGE.—Four lectures on "The Brain," "The Mind," "Moral Responsibility," and "Criminal Responsibility" will be delivered by Sir Robert Armstrong-Jones at Gresham College, Basinghall-street, London, E.C., on Oct. 24th, 25th, 26th, and 27th, at 6 P.M. Admission free to men and women.

SOCIETY OF SUPERINTENDENTS OF TUBERCULOSIS INSTITUTIONS.—A meeting will be held at 122, Harley-street, at 4 P.M., on Oct. 27th, when Sir Robert Jones will read a paper on Tuberculous Disease of the Knee, Ankle, and Tarsus, and Dr. Gordon Pugh will read a paper on Observations on the Treatment of Tubercular Disease of the Spine and Hip-joint. A discussion on the curriculum for the training of nurses in tuberculosis will follow.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.—At a quarterly council meeting held on Oct. 12th the secretary reported the death on Sept. 5th, at the age of 53, of Sir Charles Ryall, member of the Council, and a vote of condolence was passed. The President reported that the vacancy in the Council thus occasioned would be filled up at the meeting of Fellows in July, 1923.—A report from the Jenks Scholarship Committee was read, and in pursuance of the recommendation contained in it Mr. Douglas Stanley-Jones was nominated as the thirtieth Jenks Scholar.—A letter from the secretary to the College of Preceptors was read, enclosing a copy of the report of the Joint Committee on the Physical Education of Girls, expressing his Council's appreciation of the able assistance rendered by the representatives of the Royal College of Surgeons.

THE annual dinner of the past and present students of Manchester University Medical School will be held in the Midland Hotel, Manchester, on Thursday, Nov. 9th. Tickets may be obtained on application to Mr. A. M. Jones, hon. sec., Medical School, Manchester University.

HOSPITAL COLLECTING BOXES AT WORTHING.—Difficulty having been experienced in organising the hospital parade which has been an annual institution at Worthing for some 10 years, this year the parade will be abandoned, and instead every house in the borough will be supplied with a hospital collecting box. Nearly £1500 have been raised, mainly for the local hospital during the last 10 years on the old system, and it is hoped that this source of revenue will not be lost to the hospital.

MEDICAL WOMEN'S FEDERATION: COUNCIL MEETING.—The half-yearly meeting of the Council of the Federation was held in the rooms of the Medical Institution at Liverpool from Oct. 12th to 14th, under the presidency of Lady Barrett, M.D. Several cases of unequal payment or unfair treatment of medical women were reported and considered. It was determined to continue to maintain energetically the principle of equal pay for equal work, and to resist especially the attempts of Government and municipal authorities to obtain women at lower pay or to give them less opportunity of advancement than men. It was also decided to develop on a larger scale the work of assisting medical women to obtain posts, and for this purpose to obtain early notice of vacancies, and to invite medical women seeking practices or assistantships to apply to the office of the Federation.

Reports on the various committees of the Federation were received and considered. The report of the Standing Committee on Venereal Disease contained a concise statement of the lines of policy of the different bodies concerned with venereal disease and of the views of the Medical Women's Federation. This has been incorporated in a memorandum. The Sub-Committee on Birth Control reported that demands were often received for some pronouncement on this difficult subject. The sub-committee was authorised to draw up a pamphlet for the guidance of newly qualified medical women. The Standing Committee for the Defence of Married Medical Women reported that it had been agreed to join a deputation to the Prime Minister now being arranged by the Six Point Group to protest against the manner in which the Sex Disqualification (Removal) Bill, when tested, had failed to attain its object, and to ask for its amendment. The delegate from the Federation would specially bring forward the injustices to which married medical women have recently been subjected. The report of the Sub-Committee on International Relations dealt with the recent Conference at Geneva.

At the conclusion of the Council meetings a general meeting was held at which Lady Barrett gave a presidential address on the work and value of the Federation. The question of the Federation joining the International Association was then brought forward. Dr. Christine Murrell, Dr. Catherine Chisholm, Dr. Dickinson Berry, and Dr. Jane Walker spoke on the work of the Conference and the new constitution. After a short discussion the meeting voted unanimously in favour of joining the International Association. On the evening of Oct. 13th an At Home was given by the President, Miss Frances Ivens, and the members of the Liverpool Medical Women's Association.

London Association of the Medical Women's Federation.—A meeting of this association was held on Oct. 10th, Dr. Louisa Martindale, the President, being in the chair. Lady Florence Barrett gave a report of the International Meeting of Medical Women held at Geneva in September last. At that meeting 80 medical women were present, representing 18 countries. Lady Barrett stated that the idea of an International Association of Medical Women had originated simultaneously here and in America. The Medical Women's Federation here had hoped to inaugurate an International Association which should be composed of National Associations, while in America an International Association had already been started in 1919 composed of individual members from many countries of the world. At the request of the American section, the Medical Women's Federation of Great Britain drew up a draft constitution which was presented to the Geneva Conference of 1922. The delegates from the Federation to this Constitution Committee were: Dr. Jane Walker, chairman of the Committee at Geneva; Dr. Catherine Chisholm, Dr. Christine Murrell, and Dr. Dickinson Berry, joint secretaries to the Committee; and Lady Barrett, President of the Medical Women's Federation of Great Britain. Lady Barrett said that there was considerable difference of opinion at the Conference as to the basis of membership, but that finally a compromise was reached, when it was decided that membership should be on the following basis: National associations of medical women, in some cases sections of medical women, and in a few instances individual medical women should be eligible.

AT the meeting of the Council held on Oct. 10th Dr. A. J. Barnes, of Dublin, was re-elected President of the Pharmaceutical Society of Ireland for the ensuing year.

HARVEIAN SOCIETY OF LONDON.—A meeting will be held at the Town Hall, Harrow-road, Paddington Green, London, W. 2, on Oct. 26th, at 8.30 P.M., when a discussion on the Notification of Infectious Diseases will be opened by Dr. Reginald Dudfield, followed by Dr. C. Buttar, Dr. F. N. Kay Menzies, Dr. W. H. Hamer, and Dr. T. Carnwath.

NATIONAL MILK CONFERENCE AT THE GUILDHALL. This Conference, which opened on Monday, Oct. 16th, at the Guildhall, London, was convened by the National Clean Milk Society, with the support of a score of medical, hygienic, and dairying associations. The agricultural and public health interests were well represented in the attendance. Lord Astor, in his inaugural address, said that the small agricultural area of this country needed the best people to develop it. Dairying should be the corner-stone of our national agricultural policy. The farmer was not a philanthropist, but ought to be a business man and aim at a lower cost of production. The average yield of milk per cow must be increased. Danes were no cleverer than Englishmen, but an intelligent and sustained effort by the authorities in Denmark had developed milk-recording, coöperative trading, and standardisation of produce to the great advantage of the industry. Lord Astor went on to say that clean milk was just as important to children as pure water to persons of all ages. They must create a public demand for clean milk by propaganda. An increased consumption of milk was vitally important for both children and farmers.

Sir A. Griffith-Boscawen, Minister of Agriculture, who presided at the morning session, said there was no doubt of the value of milk as a food. It was generally held that the nations which consumed the most milk were the strongest, healthiest, and most vigorous. This Conference ought to bring enlightenment and stimulate research. The Ministry of Agriculture was encouraging a milk-recording scheme. The feeding of cattle was often very wasteful, and the breed of dairy cow must be carefully chosen. Lord Bledisloe said they must boom their wares, and appealed for the assistance of the medical profession. Mr. James Mackintosh, of the Reading Dairying College, read a paper on the Effect of Breed on the Quantity, Quality, and Cost of the Milk, and showed how little was known on this subject. The only data he could use were the showyard trials of the British Dairy Farmers' Association and of the Royal Agricultural Society. These were quite inadequate and further research was required.

The agricultural organisers for Kent and East Sussex, Messrs. G. H. Garrad and R. H. B. Jesse, spoke as to the very valuable work which was being done in their counties through milk-recording societies. They both found that many farmers did not realise the cost of the food they gave. The cost of food had varied in recent years from 7*d.* to 2*s.* 2*d.* per gallon of milk produced in Kent, and from 1*s.* to 1*s.* 5*d.* in East Sussex. As a rule the most expensively fed cows gave the least milk. Both speakers concurred in praising the Mackintosh food standards and rations. Thus one clear way for the reduction of cost was shown.

At the afternoon session Sir Stewart Slockman, in a paper on Epizootic Abortion, showed the great loss to the dairying industry from this disease and the encouraging results of vaccine treatment; and Mr. Arnold Lejeune, the manager of a Grade A (certified) Farm, read a paper on the Production of Clean Milk. Among the requisites Mr. Lejeune put first in importance educated labour. Healthy cows and some additional equipment, though not necessarily expensive, were required. There must be some additional cost.

Dr. Stenhouse Williams, of the Reading College, emphasised the last point, and said at first the Reading public was unwilling to pay, but that they had been converted. Leicester had taken the matter up and agreed to pay extra for Grade A certified milk for their hospitals and schools.

The papers and discussions aroused great interest.

BELFAST MEDICAL SCHOOL: OPENING OF THE SESSION.—The present session was opened on Oct. 12th, when an address was delivered at the Royal Victoria Hospital by the Marquis of Londonderry, Minister of Education in the Parliament of Northern Ireland. The chair was occupied by Colonel Sinclair, and there was a very large attendance of the members of the staff, the officials of the hospital, and students of both sexes. The Chairman alluded to the prosperous condition of the Medical School, which he believed was now in point of numbers the fourth medical school in the British Isles. Lord Londonderry, who was enthusiastically received, expressed his sympathy with the hospital and the Belfast Medical School. He alluded to the great part played by Viscount and Viscountess Pirrie in the erection and equipment of the hospital, an institution in which the citizens of Belfast took a justifiable pride. The Medical School was a very important factor in the University, and the University was the roof and crown of all their educational machinery. As Minister of Education it was his aim to provide for the Northern Province a system of education in all its branches which would be an advance upon what they had hitherto enjoyed. He hoped that in a short time they would have a system which would afford everyone the fullest opportunities for equipping himself for the work and duties of life. He believed that the dark clouds which had hung over their Province were passing away, that they were making progress, and that they were shaping themselves as an important community—self-respecting, courageous, and loyal. The result depended upon everyone playing his part, and the future of the students whom he addressed depended mainly on themselves. They should take an interest in public affairs, and in their debating societies discuss matters pertaining to the welfare of their country. They had now ample opportunities and facilities for preparing for their work in life. The hospital was a monument to the energy and capacity of its board of management. He cordially wished them all Godspeed.

MEASLES EPIDEMIC IN MANCHESTER.—The epidemic of measles which has during the last five months prevailed in Manchester continues to decrease. For the week ended Oct. 7th there were 165 new cases and 2 deaths, compared with 210 new cases and 5 deaths during the previous week.

MEMORIAL SERVICE FOR DR. M. MITCHELL BIRD.—A memorial service for the late Dr. M. Mitchell Bird, medical superintendent of St. Mary's Hospital, Paddington, for over 30 years, will be held in the chapel of the hospital on Tuesday, Oct. 24th, at 2.30 P.M.

ROYAL MICROSCOPICAL SOCIETY.—On Oct. 11th a well-attended conversazione was held at 8, Queen's-square, London, W.C. The president, Prof. F. J. Cheshire, received the guests, and a number of interesting general and trade exhibits were on view. Photo-micrographs of complete transverse sections of the human fœtus were shown by Mr. W. E. Hall; while Mr. E. Cuzner showed excellent stereo-photomicrographs of Tunicata. Microscopic preparations of leprosy bacilli from the National Institute for Medical Research, Hampstead, of trypanosomes from the London School of Tropical Medicine, and specimens showing actual circulation of the blood were specially popular, the pond life exhibits hardly less so. During the evening three short lantern demonstrations were given. Dr. A. H. Drew described and demonstrated his work on the In Vitro Culture of Tissues, to which we refer elsewhere in this issue (p. 871). Mr. D. J. Scourfield discussed the Smallest Forms of Pond Life and their Biological Significance, while Dr. J. A. Murray described the microscopic anatomy of cancer in non-technical terms. He confined himself to cancer of the epithelial tissues, and pointed out that the diagnostic feature of this form of cancer was the appearance of epithelial cells in tissues where they would not normally penetrate.

The programme for the session has now been issued. On Oct. 18th Prof. R. Ruggles Gates presented a communication from Prof. Robert Chambers on New Apparatus and Methods for the Dissection and Injection of Living Cells, while Mr. T. F. Conolly discussed the Specification of a Medical Microscope. Among the future communications there are several of medical interest. On Nov. 15th Mr. Conrad Beck will speak on Glare and Flooding in Microscope Illumination, and Dr. Charles Singer on the First Mechanical Microtome. On Dec. 20th Mr. J. E. Barnard will give an address on Sub-Bacteria. On Feb. 21st, 1923, Sir William Bayliss, F.R.S., will discuss Microscopical Staining and Colloids, and on March 21st Mr. E. Hatschek will speak on the Standard Methods of Ultra-Microscopy. On June 20th the hon. secretary will communicate papers by the late Dr. J. Blomfield on (*a*) Witches' Brooms; (*b*) Tumours of Trees: Birch. Further original communications will be welcomed by the hon. secretaries, Mr. J. E. Barnard and Dr. J. A. Murray, and should be addressed to them at 20, Hanover-square, London, W.

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Medical Diary.

Information to be included in this column should reach us in proper form on Tuesday, and cannot appear if it reaches us later than the first post on Wednesday morning.

SOCIETIES.

ROYAL SOCIETY OF MEDICINE, 1, Wimpole-street, W.

MEETINGS OF SECTIONS.

Monday, Oct. 23rd.

ODONTOLOGY: at 8 P.M.
Presidential Address:
Mr. W. R. Ackland: Some Considerations for Preventive Dentistry.

Tuesday, Oct. 24th.

MEDICINE: at 5.30 P.M.
Presidential Address:
By Dr. Newton Pitt.
Paper:
Major-General Sir John Moore, R.A.V.C.: Glanders and Anthrax.
To be followed by a Discussion, to which all Fellows interested in the subject are invited to contribute.

Thursday, Oct. 26th.

UROLOGY:
At 2.30 P.M.
Operations at St. Peter's Hospital.
At 8.30 P.M.
Presidential Address:
Sir John Thomson Walker: Relation of Calcified Abdominal Glands to Urinary Surgery.

Friday, Oct. 27th.

STUDY OF DISEASE IN CHILDREN: at 5 P.M. (Cases at 4.30 P.M.)
Cases: Dr. R. C. Jewesbury will show two cases of Duodenal Atresia.
Presidential Address:
Dr. Eric Pritchard: Rickets, Its Causation and Pathogenesis.

EPIDEMIOLOGY AND STATE MEDICINE: at 8 P.M.
Paper:
Dr. R. J. Ewart: Economics and Tuberculosis.

ELECTRO-THERAPEUTICS: at 8.30 P.M.
Presidential Address:
Dr. Robert Knox: Cardiac Diagnosis: a Survey of the Development of Physical Methods.
There will also be an exhibition of apparatus and radiograms bearing upon the diagnosis of heart conditions.

LECTURES, ADDRESSES, DEMONSTRATIONS, &c.

FELLOWSHIP OF MEDICINE POST-GRADUATE LECTURES, 1, Wimpole-street, W.
WEDNESDAY, Oct. 25th.—8.30 P.M., Dr. Eric Pritchard: The Feeding of Infants from Birth to the End of the Second Year.

WEST LONDON HOSPITAL POST-GRADUATE COLLEGE, West London Hospital, Hammersmith-road, W.
MONDAY, Oct. 23rd.—10.30 A.M., Mr. Maingot: Surgical Pathology. 12.15 P.M., Dr. Burnford: Pathological Demonstration. 4.30 P.M., Dr. Saunders: Nephritis in Children and its Treatment.
TUESDAY.—10 A.M., Dr. Paterson: Demonstration of Medical Cases. 12 noon, Mr. Sinclair: Surgical Diseases of Abdomen. 4.30 P.M., Mr. Addison: Tuberculous Disease of the Spine.
WEDNESDAY.—10 A.M., Dr. Saunders: Medical Diseases of Children. 12 noon, Mr. Simmonds: Demonstration of Fractures. 4.30 P.M., Dr. Pernet: Itching.
THURSDAY.—10 A.M., Dr. Grainger Stewart: Neurological Department. 12 noon, Dr. Scott Pinchin: Disease of the Heart. 4.30 P.M., Mr. Todd: The Orthopædic Treatment of Infantile Paralysis.
FRIDAY.—11 A.M., Dr. McDougal: Electrical Department. 12.15 P.M., Dr. Burnford: Applied Pathology. 4.30 P.M., Mr. Simson: Modern Developments in the Management of Labour.
SATURDAY.—9 A.M., Dr. Burnford: Bacterial Therapy. 10 A.M., Mr. Simmonds: Orthopædic Department.
Daily, 10 A.M. to 6 P.M., Saturdays, 10 A.M. to 1 P.M., Inpatients, Out-patients, Operations, Special Departments.

SOUTH-WEST LONDON POST-GRADUATE ASSOCIATION, St. James' Hospital, Ouseley-road, Balham.
FRIDAY, Oct. 27th.—4.30 P.M., Dr. Wordsworth Barber: Principles of Treatment in Diseases of the Skin.

NATIONAL HOSPITAL FOR THE PARALYSED AND EPILEPTIC, Queen-square, Bloomsbury, W.C. 1.
POST-GRADUATE COURSE: OCT.–DEC., 1922.
CLINICAL LECTURES AND DEMONSTRATIONS.
MONDAY, Oct. 23rd.—2 P.M., Out-patient Clinic: Dr. Hinds Howell. 3.30 P.M., Clinical Lecture: Dr. James Taylor.
TUESDAY, Oct. 24th.—2 P.M., Out-patient Clinic: Dr. Grainger Stewart. 3.30 P.M., Lecture:—Syphilitic Disease of the Nervous System: Dr. Hinds Howell.
THURSDAY, Oct. 26th.—2 P.M., Out-patient Clinic: Dr. Kinnier Wilson. 3.30 P.M., Clinical Lecture: Dr. Grainger Stewart.
FRIDAY, Oct. 27th.—2 P.M., Out-patient Clinic: Dr. Gordon Holmes. 3.30 P.M., Lecture:—Encephalitis Lethargica: Dr. Collier.
Mr. Armour and Mr. Sargent operate at the Hospital on Tuesday and Friday mornings at 9 A.M., or at such other times as may be announced.
Lecture on NEURO-OPHTHALMOLOGY (in the Lecture Theatre). WEDNESDAY, Oct. 25th.—3.30 P.M., Papilloedema: Mr. Leslie Paton.
N.B.—Not more than fourteen Candidates can attend this Course.
Lectures on NEURO-PATHOLOGY. MONDAY, Oct. 23rd.—12 noon, Cerebro-Spinal Fluid. III., Pathology. THURSDAY, Oct. 26th.—12 noon, The Neuron: Dr. J. Godwin Greenfield.
The fee for the whole Course, including Mr. Paton's Lectures, is £14 14s.; but these Lectures may be taken separately for a fee of £6 6s. Any part of the Course may be taken separately at a special fee. Special arrangements will be made for those unable to take the whole Course. Fees should be paid to the Secretary of the Hospital at the office on entering for the Course.
C. M. HINDS HOWELL, Dean of Medical School.

LONDON LOCK HOSPITAL, 91, Dean-street, W. 1.
MONDAY, Oct. 23rd.—5 P.M., Mr. Charles Gibbs: Antenatal and Postnatal Treatment of Syphilis.
TUESDAY.—2.30 P.M., Mr. J. E. R. McDonagh: Clinical Demonstration with Exhibition of Paintings. 4.30 P.M., Mr. Swift Joly: Some Complications of Gonorrhœa in the Male.
THURSDAY.—2.30 P.M., Mr. W. Victor Corbett: Interpretations of the Wassermann Reaction.
FRIDAY.—4 P.M., Mr. Johnston Abraham: Syphilis in Women.

ST. JOHN'S HOSPITAL, 49, Leicester-square, W.C.
THURSDAY, Oct. 26th.—5 P.M., Dr. W. K. Sibley: Electrical Treatments. X Rays.

NATIONAL HOSPITAL FOR DISEASES OF THE HEART, Westmoreland-street, Marylebone.
MONDAY, Oct. 23rd.—5.30 P.M., Dr. P. Hamill: Diseases of the Myocardium.

MANCHESTER ROYAL INFIRMARY POST-GRADUATE CLINIC.
TUESDAY, Oct. 24th.—4.15 P.M., Dr. W. Dysar: Diseases of the Hair.
FRIDAY.—4.15 P.M., Dr. E. S. Reynolds: Ataxia.

MANCHESTER FRENCH HOSPITAL, 24, Acomb-street, Whitworth Park, Manchester.
THURSDAY, Oct. 26th.—4.30 P.M., Dr. A. C. Magian: Demonstration of Methods of Repairing Lacerations of the Perineum after Labour.

UNIVERSITY OF SHEFFIELD—FACULTY OF MEDICINE. Post-graduate Lectures and Demonstrations.
TUESDAY, Oct. 24th.—3 P.M. (at the Royal Infirmary), Dr. Kerr: Some Points in the Diagnosis and Treatment of Chronic Maxillary Sinusitis. 4 P.M., Mr. Cuff: Clinical Surgery.
FRIDAY.—3 P.M. (at the Royal Hospital), Dr. Naish: Poliomyelitis. 4 P.M., Mr. Garrick Wilson: Demonstration of Cases.

ROYAL INSTITUTE OF PUBLIC HEALTH, 37, Russell-square, W.C.
Course of Lectures on Maternity, Child Welfare, and School Hygiene.
WEDNESDAY, Oct. 25th.—4 P.M., Dr. G. E. Oates: The Organisation and Function of a Maternity Clinic.

Appointments.

TAIT, A., M.B., Ch.B. Aberd., has been appointed Junior Assistant Physician to the Crichton Royal Institution, Dumfries.

St. Mary's Hospital Medical School: COMPTON, A., D.Sc., M.B., B.Ch., B.A.O. R.U.I., Third Assistant in the Surgical Unit; QUINTON, P. G., M.D., B.S. Lond., M.R.C.S., L.R.C.P. Lond., Medical Superintendent of the Hospital.

Royal Infirmary, Sunderland: MARR, A. M., M.B., Ch.B. Edin., House Physician; MILNE, J., M.B., Ch.B. Aberd., House Surgeon.

Certifying Surgeons under the Factory and Workshop Acts: DAVIDSON, A. H., M.B., Ch.B. Glasg., Alva, Clackmannan; EVANS, W. O., L.R.C.P. & S. Edin., L.R.F.P.S. Glasg., Pontardawe, Glamorgan; GRAY, J. S., M.B., Ch.B. Aberd., Sileby, Leicester.

Vacancies.

For further information refer to the advertisement columns.

Birmingham General Hospital.—H.S.'s. £95 and £70 respectively.
Bradford, Grassington Sanatorium.—Asst. Res. M.O. £250.
Bradford Royal Infirmary.—Res. S.O. £250.
Bramshott, Hants, King George's Sanatorium for Sailors.—Med. Supt. £600.
Charing Cross Hospital, Institute of Pathology.—Director of Pathology. £650.
Chelsea Hospital for Women.—Anæsth. £21.
City of London Hospital for Diseases of Chest, Victoria Park, E.—H.P. £125.
Essex County Council.—M.O.H., &c. £750.

Gloucestershire Royal Infirmary and Eye Institution.—H.S. £200.
Hong-Kong University.—Prof. of Med. £800.
Hôpital Français, 172, *Shaftesbury-avenue, W.C.*—Second Res. M.O. £100.
Hull and Goole Port Sanitary Authority.—Asst. M.O.H. £750.
Ipswich, East Suffolk and Ipswich Hospital.—Asst. S.
Larbert, Stirling District Asylum.—Asst. M.O. £300.
Lincoln County of the Parts of Lindsey.—Asst. M.O. £550.
London Hospital, Whitechapel, E.—Asst. S.
Manchester, Crossley Sanatorium, Kingswood, Frodsham.—Asst. M.O. £250.
Metropolitan Hospital, Kingsland-road, E.—Cas. O. and Res. Anæsth. £120. Asst. H.P., Sen. H.P., and Asst. H.S. £100.
Monmouthshire Education Committee.—Two Asst. M.O.'s. Each £500.
Napsbury Mental Hospital.—Jun. A.M.O. £546 14*s.*
North Middlesex Hospital, Edmonton, N.—Asst. M.O. £200.
Queen Charlotte's Lying-in Hospital, Marylebone-road, N.W.—Asst. Res. M.O. £80.
Queen Mary's Hospital for the East End, E.—Hon. Asst. S.
Royal Ear Hospital, Dean-street, Soho, W.—Hon. Res. H.S.
Royal London Ophthalmic Hospital, City-road, E.C.—Refraction Asst. £100.
Royal Waterloo Hospital for Children and Women, Waterloo-road, S.E.—Hon. P.
St. Helens Hospital, Lancashire.—Res. M.O. £250.
Warrington, Lancashire County Asylum, Winwick.—Asst. M.O. £300.
The Chief Inspector of Factories, Home Office, London, S.W., gives notice of vacancies for Certifying Surgeons under the Factory and Workshop Acts at Rainham (Essex), and at Felixstowe (Suffolk).

Births, Marriages, and Deaths.

BIRTHS.

BRACEWELL.—On Oct. 10th, at Lower Seymour-street, W., the wife of Charles H. Bracewell, M.R.C.S., L.R.C.P., of a son.
LLOYD.—On Oct. 12th, at Southend-on-Sea, the wife of Edmund Eyre Lloyd, M.R.C.S., L.R.C.P., of a daughter.
RAVEN.—On Oct. 9th, at Barfield House, Broadstairs, the wife of Hugh M. Raven, M.R.C.S., L.R.C.P., of a son.
SHARROD.—On Oct. 7th, at Langdale, New-road, Stourbridge, the wife of A. R. Sharrod, M.B., B.S., of a son.

MARRIAGES.

DUKE—SPACKMAN.—On Oct. 9th, at St. Mary's Church, Bedford, Benjamin Duke, M.D., of Clapham Common, to Florence Annie Spackman, daughter of the late Henry Spackman, of Bath.
ECCLES—BUTCHER.—On Oct. 9th, at Princes-row, Buckingham Gate, S.W., George Dunluce Eccles, M.C., M.B., to Nora Butcher, widow of Frederick Butcher, Major, R.F.A.
MURPHY—WORTH.—On Oct. 11th, at the Brompton Oratory, James Murphy, M.B.E., F.R.C.S., to Miss Nellie Louise Worth.

DEATHS.

HORT.—On Oct. 14th, at Cannes, Edward Collett Hort, F.R.C.P. Edin., the dearly loved husband of Ethel Augusta and third son of the late Fenton John Antony Hort, D.D. Cambridge.
LANGTON.—On Oct. 12th, suddenly, at a nursing home, Herbert Langton, M.R.C.S., L.R.C.P., of 61, Dyke-road, Brighton, aged 69 years.
RENDLE.—On Oct. 11th, at Sunderland-road, Forest Hill, S.E., George Rendle, M.R.C.S., in his eightieth year.
ROBBS.—On Oct. 11th, at Lodgewood, Gravesend, Charles Edward Robbs, M.B., aged 63 years.
YOUNG.—On April 29th, of typhus fever, at the Baptist Mission Hospital, San Yuan, Shensi, China, Andrew Young, L.R.C.P. & S. Edin., aged 53.

N.B.—A fee of 7s. 6d. is charged for the insertion of Notices of Births, Marriages, and Deaths.

HEALTH WEEK IN HOLBORN.—Strenuous efforts were made in the metropolitan borough of Holborn to make Health Week a period of useful educational propaganda. The clergy and Sunday-school teachers were asked to coöperate; also the head teachers in elementary schools. Two prizes for each school were offered for the best essays on "How I Can Keep Myself Healthy," the essays to be based either on special lessons or on the routine lessons on hygiene given during the year. A party of girls and of boys from the two school departments submitting the best essays were invited to visit the municipal institutions, and arrangements were made for the exhibition of a health film at the local cinema. The literature distributed included leaflets specially prepared on (*a*) "London's Health: Ten Ways to Help It"; (*b*) "Self-help in Health: Hints to Women"; (*c*) "Food Points for Shoppers." Twelve of the larger employers of labour consented to give facilities for addresses to their staffs; of these, seven were given by Dr. C. W. Hutt, medical officer of health, and five by Miss E. Charlesworth. A special meeting of mothers at the maternity and child welfare centre on Oct. 12th was addressed by Lady Mond and Dr. Charles Porter, medical officer of health of St. Marylebone, and was largely attended.

Notes, Short Comments, and Answers to Correspondents.

THE HANDLING AND DISTRIBUTION OF MILK.*

BY JOHN ROBERTSON, C.M.G., M.D., B.SC. EDIN.,
MEDICAL OFFICER OF HEALTH, BIRMINGHAM.

IN this paper on the handling and distribution of milk I am going to assume that the handling commences at the time the milk leaves the cow and that it ends when it is consumed by the purchaser. It will be obvious to all that the methods of handling and distributing milk which are practicable in a rural district are entirely insufficient in a large city. It will, therefore, be more useful if I confine my remarks to the most difficult type of distribution, that of sending and distributing milk to large cities. I know, however, that there are very important questions relating to the distribution of milk in rural districts. Many of the children in these districts get little or no milk because of these difficulties, and I am convinced that action will have to be taken in the near future with a view to seeing that rural populations are reasonably supplied.

The Price of Milk.

There is one other limiting consideration which needs to be mentioned, and that is the question of the cost of milk to the consumer. It is difficult to suggest means of improving the quality and the character of the milk which will not materially increase the price to the consumer. The consumer would then limit his supply, greatly to his detriment. Furthermore, any large increase in the price of milk would drive the industrial population of this country to use foreign condensed milk, re-constituted milk, or milk imported from foreign countries. It is possible at the present time to bring fresh milk from almost any part of the world and sell it as fresh milk in England. Such a proceeding is, at the present time, not practicable, but it is a danger we have to bear in mind when dealing with the dairy industry.

Milk has been sold by farmers during the past summer at prices varying from 9*d.* per gallon to 1*s.* per gallon exclusive of railway rates. This milk has been sold to the consumer at prices varying from 1*s.* 8*d.* to 2*s.* That is to say, that the handling and distribution of milk in towns has raised the cost of milk more than 100 per cent. above the cost of production, or in other words, it costs as much to distribute a gallon of milk as it does to produce a gallon. The present methods of handling and delivery thus appear to be costly as well as inefficient. Much milk arrives in our towns in such a condition that it cannot be kept for a reasonable time in the dwelling-house without fear of its turning sour. I need not dwell on the marvellous growth which takes place when even one bacterium falls into such a nourishing fluid as cow's milk. I need only remind you that in warm milk it is theoretically possible for one bacterium to become many millions in a few hours.

Bacterial Content of Milk.

A milk dealer in Birmingham in the summer of 1921 asked me to test the bacterial content of milk from 61 farms (most of them good farms) at the time when such milk arrived on his premises. One sample was taken, with the necessary precautions, each fortnight, and examined under standard and uniform conditions. The farmers knew that the tests were being made and they received from the dairyman valuable money prizes for the cleanest milk. It is safe, therefore, to say that the results I obtained are better than would have been obtained from average milk samples. A summary of results shows that the lowest count per c.cm. was 560 and the highest count, 28,350,000. The results of a miscellaneous number of samples examined at Birmingham during recent years is shown in the table given below.

Bacteria in Birmingham Milks.

Year.	Number of samples tested.	Average number of bacteria per sample per c.cm.	Lowest number of bacteria per c.cm.	Highest number of bacteria per c.cm.
1918	303	1,640,000	8,000	13,450,000
1919	297	1,841,000	8,500	39,800,000
1920	335	2,237,000	41,800	31,200,000
1921	648	2,293,613	560	28,350,000

[1] Abstracted from an address to the National Milk Conference held in London from Oct. 16th to 18th.

Very similar results have been obtained in other towns where standard methods of examination have been adopted. The practical point is that such milk is a risky article to buy, and this means that people do not buy what is one of our most important foods. The production and delivery of milk has now been investigated by scientific methods and there is sufficient experience of the application of these methods for us now to be able to make suggestions which will improve the milk-supply very greatly. With the exception of very high grade qualities of milk it is generally agreed that the ordinary farmer with his existing farm buildings can produce clean milk of good quality, provided he takes some obvious precautions which, in most instances, do not entail expense. It has been demonstrated that even with dirty cows or cowsheds only fairly clean, clear milk can be produced if a sterilised covered milking pail is used and if the milker is cleanly in his methods in all respects.

In my judgment there are two essentials which should be available for every producer of milk and which are in use in most American farms at present. The one is a steriliser and the other an adequate supply of cold water for cooling the milk and for other general cleaning purposes.

Farm Steriliser.

I think it essential to recognise that sterilisation of the apparatus used to contain milk is a sine qua non. This applies to all milking pails, strainers, weighing pails, milk measures, bottles for containing milk, delivery cans, &c. Scalding with hot water undoubtedly improves the condition of these utensils but is not sufficiently effective. The use of a germicidal substance is objectionable, and I know of nothing better than the provision of a steam steriliser at the farm and at the distributing premises. Not only should the steam be sufficient in quantity to kill every germ in the utensil, but after the application of the steam the vessel should be allowed to dry. Many small sterilisers are now on the market for use at the farm, and, provided that the railway milk churns are sterilised in the city before being returned to the farm, one of these small sterilisers is amply sufficient for the farm buckets and other utensils. During my recent visit to America I found that in many areas farmers had provided themselves with small vertical boilers about 3 or 4 feet in height and 18 or 20 inches in diameter. Steam was said to be generated in these boilers in about half an hour after the fire had been lighted. This arrangement seemed to me to be a good and economical one. The larger depôts which handle 17-gallon churns should have steam available for sterilising milk churns and vessels after they have been washed out. As in the case of other articles, the 17-gallon churns should be allowed to dry before the lids are put on. The custom of returning the churns to the farmers without having them washed out and sterilised is an objectionable one.

Cooling the Milk.

Having drawn the milk under clean conditions into a sterilised covered milking pail, and having weighed such milk, also in a sterilised weighing pail, the next essential at the farm is the cooling of the milk. This must always be a difficult process in England, because of the absence of a cheap supply of native ice. It is possible at some farms to cool by means of a water cooler to a temperature below 50° F. It is particularly important that milk which has to lie at the farm overnight should, where possible, be placed in a tank containing running spring water. At many farms during summer weather it is impossible to get temperatures below 50°, and therefore it will be impossible for the farmer to cool his milk much below 60°. The provision of ice at the farm seems to be beyond the range of practical politics at present.

The main function of our so-called creameries in this country is that of a distributing station. These creameries could be made into efficient cooling depôts, where milk can be weighed and cooled to a temperature of 40° F. and then stored until the train arrives for its despatch. In America there are a large number of these cooling stations.

Pasteurisation of Milk.

Even good milk under present conditions may contain up to a million bacteria per c.cm. in summer time. Some of these may be pathogenic and therefore I think all milk, except Grade "A" Certified milk, should be pasteurised, cooled, and bottled in the city. Most of the pasteurisation in this country is, from the point of view of the health of the people, inefficient. I am talking now of the flash point system which has been so universally adopted. It probably kills a good many of the disease-producing organisms which are non-sporing bacilli, but it certainly does not kill all the tubercle bacilli and many other similar organisms.

A great deal of scientific work has been done to ascertain the length of time and the degree of temperature which should be used in the pasteuriser, and most observers have agreed that a temperature of about 145° F. for half an hour is a safe practicable working arrangement. I have tried the experiment myself of heating milk for half an hour to 165° and afterwards comparing such milk with milk heated to 145°. If 165° were used, not only would the flavour be slightly altered, but the dairyman would be blamed for having abstracted fat, for the cream looks much less in volume. It is not an easy matter to heat milk to 145° without overheating some of it, and, therefore, the pasteuriser must be a carefully devised one, somewhat slow in operation. Again, it is by no means an easy matter to devise any type of holding tank which will permit milk taking exactly 30 minutes to run through it. If 145° for 30 minutes is used the lactic acid bacilli in the milk are not damaged and this does not make a sterile milk. It produces, however, a milk which contains only a few hundred organisms per c.cm.

There is one serious objection which can be raised to milk pasteurised by the best possible method and that is the opinion of workers in this country, in America, and on the continent that damage is done to the antiscorbutic vitamin. Where such milk is used for the bottle-fed infants it is absolutely essential that some antiscorbutic substance should be given to the infant twice or oftener every week. The fat-soluble A-vitamin and the antineuritic vitamin (the latter is a negligible quantity in milk) apparently are not damaged by low temperature pasteurisation. Milk which has been through a pasteuriser must be cooled to the lowest temperature possible, not higher than 40° F.

Distribution.

I believe it will be a great mistake to attempt to distribute this good clean milk by the crude method of dipping a measure into the churn in the streets and pouring it into the dirty jugs with which many householders supply dairymen, and afterwards allowing the milk to stand in open vessels in the dwelling house. Unless, therefore, the milk is bottled, I do not think we ought to go to the trouble and care at the farm, care in transit, and care at the dairy in pasteurising. I am firmly convinced that milk, after it has been pasteurised and cooled, should be bottled in sterile bottles. In Birmingham there is, at present, a considerable supply of sterilised milk in bottles. I have no doubt whatever that part of the reduction in child mortality has been due to this sterilised milk. I am convinced that pasteurisation is better than sterilisation. I mention the question of sterilisation of milk because I think it has had an effect on the child mortality and because I recognise that bottled milk in these poor households is in much better condition than if it had been tipped out of a serving can into a more or less dirty jug.

The really practical point is as to whether all this can be done without materially increasing the cost. My answer would be that it has been done in America. In the United States milk is about 50 per cent. higher in cost than it was before the war, and this is due to the higher cost of labour, feeding stuffs, &c. Before the war pasteurisation and bottling did not raise the price. I am entirely against any attempt being made to establish a municipal milk-supply. I think that such would be from every point of view a mistake, and, therefore, one must look to see whether our present methods can be reduced in cost. I suppose everybody present can point to inefficient methods. Perhaps the first and most obvious that will occur is that of the extraordinary competition that goes on among roundsmen. Every long street in a city is visited by 10 or 20 vendors in a day, and, in addition, there are shops retailing milk. Everyone of these vendors is selling what is for all practical purposes the same article. In my judgment this redundancy can, and must, be dealt with by the trade itself. When all milk has to be pasteurised it will mean almost at once that we shall have fewer and better distributors. The distribution of milk in bottles is easier and more economical, and a great saving ought to occur if such milk were available everywhere.

Conclusion and Summary.

I believe our dairy trade is alive to the need of improvement in the methods of handling milk, and the first necessity is a campaign to give all farmers and workers in the trade the necessary information as to what science has done in recent years. When this has been done, I have not the slightest doubt that the trade will immensely improve matters in regard to the handling of milk and the distribution of milk. So soon as the trade in general has adopted good methods it will be necessary to obtain further legislation so as to prevent unfair competition which may arise between the good and bad distributor. It may then be necessary, as has been done in many American cities, to prevent milk being sold to householders except in bottles, and it may also be necessary to set up a standard of bacterial content, but at the present time I feel strongly that we are not ready for any such regulations. If I had to summarise my recommendations I should put them as follows: 1. All dairy apparatus used to contain milk should be sterilised and dried immediately after use. 2. Much greater care should be taken to secure adequate cooling of the milk at the farm and during transport. 3. All milk should be pasteurised and cooled under good conditions. 4. Distribution to the householder should be in bottles.

PUBLIC HEALTH IN PALESTINE.

(*Concluded from p. 842.*)

Hospitals and Dispensaries.

CONSIDERABLE progress has been made in regard to provision of hospital and dispensary treatment in the larger towns. There are 11 Government hospitals, of which those at Jerusalem, Haifa, Jaffa, Nablus, and Ramallah (about 10 miles north of Jerusalem) were fairly well housed at the end of 1921; while at other centres, where the buildings were unsuitable, improvements are being carried out. Also, the establishment of six matrons has been completed. Dispensaries have been opened for the treatment more especially of Government employees and school-children, and as vaccination centres; the attendances at these dispensaries reached a total of 155,523 during the year. There are also 28 voluntary hospitals and 31 voluntary dispensaries or clinics, supported by the Order of St. John, the French Syrian Government, the American Zionist Medical Unit, and various British missionary organisations. At the Government hospitals out of a total 6608 admissions, 71·4 per cent. were Moslems, 17·7 Christians, and 10·7 Jews; at the Government dispensaries and clinics, out of 155,523 attendances, 80·6 per cent. were Moslems, 14·8 Christians, and 4·4 Jews; at the various voluntary hospitals, out of 15,997 admissions, 29·9 per cent. were Moslems, 16·2 Christians, and 53·8 Jews; and at the voluntary dispensaries and clinics out of 657,610 attendances, 27·2 per cent. were Moslems, 9·3 Christians, and 63·4 Jews.

The practice of medicine and dentistry is governed by the existing Ottoman laws, the practice of pharmacy by a recent Government ordinance; great improvement has taken place in regard to the quality of drugs and medicines, and much valuable help and advice has been given by the International Society of Qualified Pharmacists. The practice of midwifery, however, is in a most unsatisfactory position: there are 51 qualified midwives in the larger towns, but "884 untrained, and in most cases grossly ignorant women registered in the district health offices" practise in the rural areas, and efforts are being made to obtain voluntary subscriptions for the establishment of centres for the teaching of midwifery and infant management.

School medical inspection is carried out, including vaccination for the children and hygiene training for the teachers; 54 town schools and 146 schools in the villages were dealt with, 13,568 children being medically examined. The school buildings are not satisfactory, but extensive sanitary improvements have been carried out. The most important disease requiring treatment has been trachoma, an average of 74 per cent. of the children suffering from this serious affection. In some of the schools in southern Palestine the prevalence even reached 97 per cent.; 15 per cent. had defective vision, 8 per cent. had four or more carious teeth, and from 20 to 65 per cent. were verminous. Splenic enlargement was found in 8 per cent., but in some districts 60 per cent. of the village school-children were affected.

Devastating Effects of Malaria.

"Malaria stands out as by far the most important disease in Palestine. For centuries it has decimated the population, and it is an effective bar to the development and settlement of large tracts of fertile land At times it assumes epidemic characters in fertile areas, wiping out the populations of whole villages in a few months' time, and there are few regions in the country actually free from it." Antimalarial work has been undertaken since early in 1918 under four heads: (1) Anti-mosquito measures were carried out, at first to some extent unpopular, but subsequently with the assistance of the inhabitants; and village water-supplies and drainage improved. In Jerusalem there were 113 deaths from malaria from April to December, 1918; during 1919, 1920, and 1921 these deaths fell to 35, 30, and 17. (2) Treatment was provided, consisting of a preliminary dose of calomel, followed by 8 g. of quinine sulphate in solution, spread over the next four days; in many districts this met with much success among the 36,416 villagers treated. In the wadies west of Hebron few persons escaped the disease, and the late crops were left standing, as the people were too sick and debilitated to gather them. In the village of Beit Jibrin 167 per 1000 of the population died in three months; there had been no such epidemic for over 50 years. The treatment of infants by rectal injection of quinine proved to be of great value. As the result of this, and energetic action in the way of drainage work and the clearance of streams, the death-rate for the last 10 months of 1921 fell to 15 per 1000, and in Beit Jibrin itself from July to September there were no deaths at all. (3) All important swamp areas in the country have been examined by the department's entomologist, and schemes for their drainage have been prepared by the sanitary engineer. The drainage of the Beisan marshes (in the Jordan Valley) was started in 1920, and has resulted in the drying up of some thousand acres of rich Government land, now ready for cotton growing; it has conserved the water for the perennial irrigation of a large additional area of the surrounding country, and has already reduced the amount of malaria in this district, "previously decimated from this cause." A similar, but smaller, scheme at Jenin (on the southern border of the plain of Esdraelon, or Megiddo) has resulted in complete disappearance of malaria among the troops and great diminution in the civil population. It has been the policy of the Government to encourage private enterprise in this important work, and it is most satisfactory to learn that the colonists at Hedera and Kinnereth and the local people at Musherifa have carried out measures of drainage in their respective districts. (4) Instruction of school teachers and children, and educational work among newly arrived immigrants in regard to malaria, its mode of spread, and the measures to be taken to avoid infection, is sure to have a beneficial effect; and owing to the importance of the subject a central advisory Commission has been instituted to deal with the whole question.

Water-supply and Other Subjects.

The equally important matter of water-supply is in process of being dealt with in a similarly satisfactory and thorough manner. The standards aimed at are: one metre transparency, absence of chemical evidence of recent sewage contamination, and absence of colon bacilli in 1 c.cm. water. Piped supplies exist in many of the larger towns, but at present (except in the case of Jerusalem) are inadequate and unsatisfactory. At Jerusalem purification is effected by bleaching powder (lactose-fermenting organisms continuously absent in 10 c.cm.); the supply is 150,000 gallons daily for 60,000 persons, which only allows of street standpipes (except in the cases of hospitals and institutions and the more wealthy inhabitants). The bulk of the drinking water, however, still comes from 6600 privately owned rain-water cisterns. Schemes have been, or are being, drawn up for the city (which should have its supply more than doubled next year), Jaffa, Nablus, Hebron, Tiberias, and Haifa.

Among many other subjects dealt with in this report, space only allows of reference to a few points of especial interest. "Trachoma is the most prevalent disease in Palestine, and comes second to malaria in its economic importance. In some districts 97 per cent. of the inhabitants are affected." It accounts for most of the blindness, and is the chief cause of visual disability in school-children. The Gaza Travelling Ophthalmic Hospital started work in 1919; in 1921 there were 23,178 attendances, and 2061 operations were performed; 81·6 per cent. of the attendances were for trachoma. Out of 2166 children in 11 schools under Government medical supervision in Jerusalem, 1670 were under treatment during 1921 for trachoma, of whom 61 per cent. were cured. A central bacteriological laboratory has been established at Haifa, in which much valuable work has been carried out in many directions; there are also clinical laboratories at Jaffa, Nablus, and Gaza, and a Pasteur Institute at Jerusalem. "Very definite light has been thrown on the presence of bilharzia in the country"; *Schistosoma hæmatobium* has been found in 355 cases in the neighbourhood of Jaffa during the year.

This extremely interesting and valuable report—a record of the first systematic and thorough attempt at sanitation that has been effected in modern times in the country—bears no signature and no names are mentioned throughout.

Enquirer.—It is usual to include any fees received from the Ministry of Pensions in calculating for sale the gross receipts of a practice. These fees, of course, appear in the cash book, and intending purchasers would have their attention called to the item as, if of considerable amount, it would affect the selling value.

P. A. and E. C.—Milk holds an important position as a food because it contains proteins and mineral salts, as well as fat and carbohydrates, also vitamins. The nutritive value of any protein is dependent on the particular kind of amino-acid which it contains. The chief protein of milk—casein—is of specially high food value, and, in contrast with meat protein, does not lead to intestinal putrefaction. In fact, milk tends to reduce intestinal putrefaction, probably because it provides proper pabulum for the lactic organism, which for some reason or other keeps down the putrefactive bacteria. The low melting-point of butter fat makes it one of the most digestible of all animal fats, and the carbohydrate of milk—lactose—is also easily digested. The nutritive requirements of an adult man can be met by about eight pints of milk a day. This is a large amount to drink, and, moreover, ill-balanced for an adult, since milk is relatively poor in carbohydrate. One of the chief disadvantages of milk is that it does not leave enough residue for stimulating the intestine, so that milk is a constipating food; brown bread and milk would therefore be better than white bread and milk. Milk was formerly one of the cheapest sources of animal protein, and even at the present price is probably cheaper than some popular sources.